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Microfiche
Series
(Monographs)**

**ICMH
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(monographies)**



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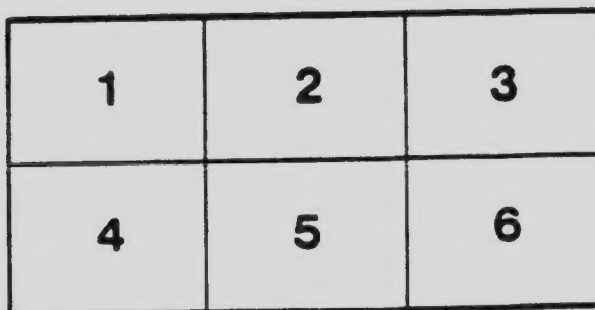
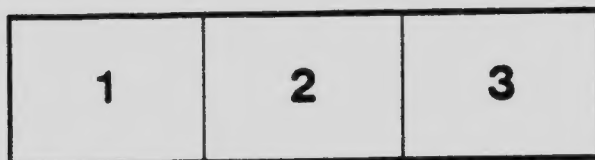
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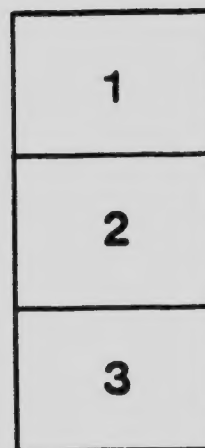
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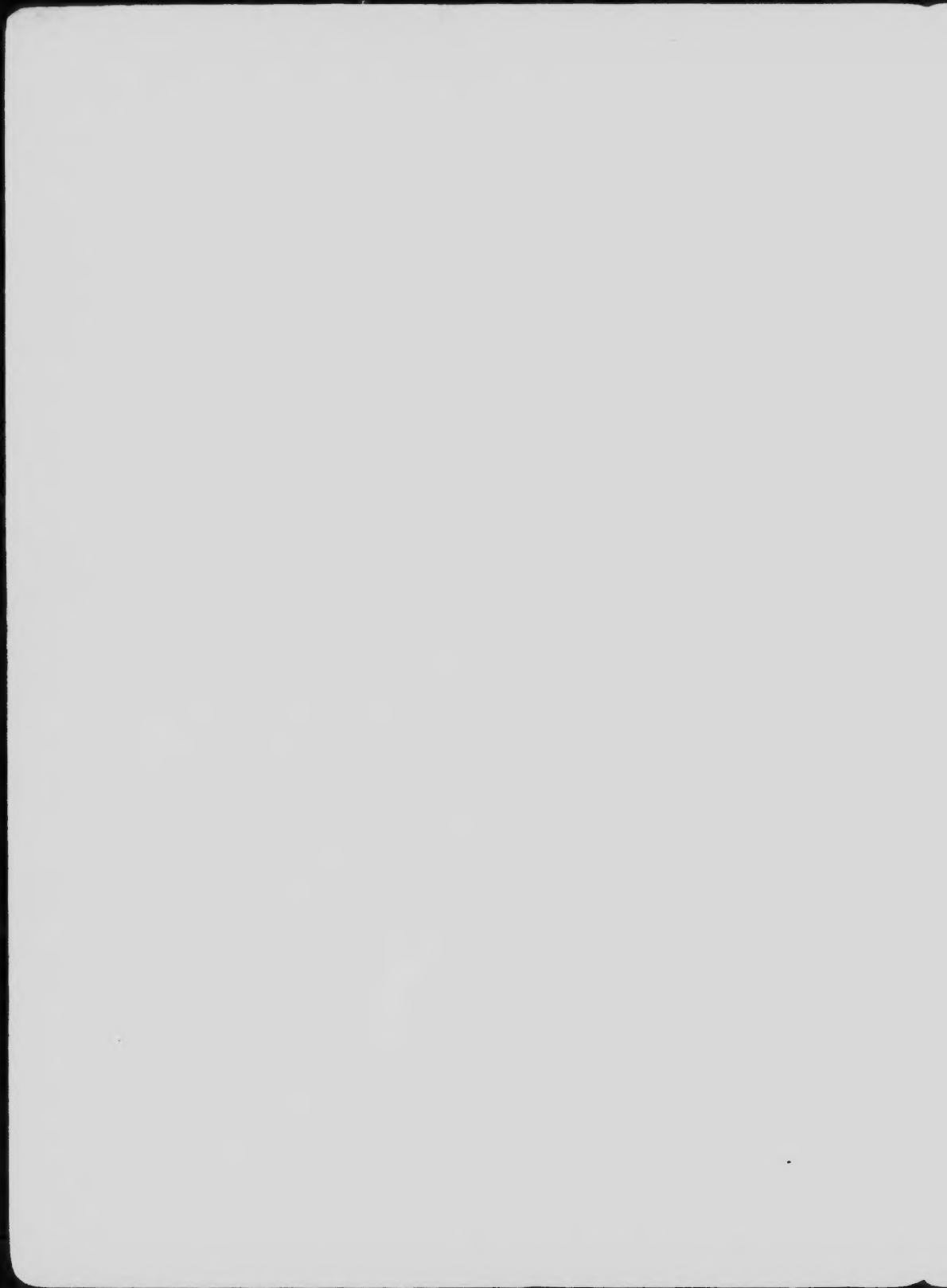
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(ANSI and ISO TEST CHART No. 2)

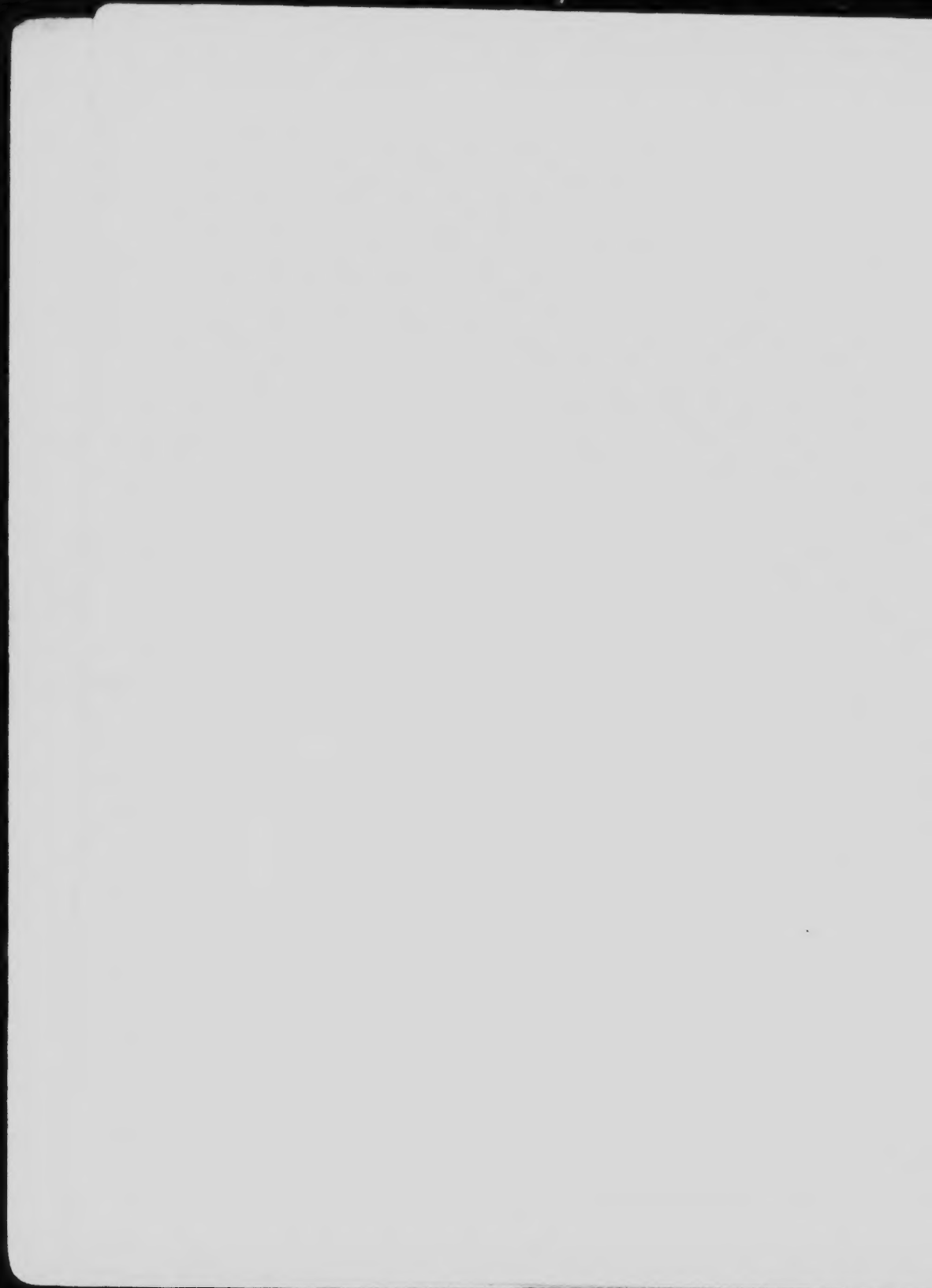


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~~Form II E. O. C. I.~~

Form II E. O. C. I.



WRIGHT'S RAPID CALCULATOR

BY

T. F. WRIGHT

103 BEATRICE STREET, TORONTO, CANADA

An Invaluable Aid to Efficiency
With Figures.

For Use in Offices, Schools
and Colleges.

TORONTO:

ROUS & MANN, LIMITED, PRINTERS, YORK STREET

1909

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READING FIGURES AT SIGHT.

The reading of figures at sight can be accomplished as easily as the reading of letters or words. It is an accomplishment every ambitious young person should strive to gain, nor should the task be too hard nor irksome. To those gifted with the natural faculties, eye-sight and brain-power, accompanied by a willingness to spend a few minutes each day in actual practice of the exercises here outlined, results that will astonish even the most pessimistic will be produced in but a few weeks. When a little chap—a tiny lassie—you did not learn to run before you could walk—neither must you expect to run in the reading of figures until you can move steadily and surely along. Too many being over eager to advance, try to count by eights and nines before they can add by twos and threes. This is a serious mistake. One should learn to add twos and threes readily before introducing a four, a five, or any larger number. The motto "If at first you don't succeed, try, try again," though an old one, is yet applicable to the one who would reach the goal "Rapidity and Accuracy with Figures."

Do not be satisfied with anything short of "correct results." Results count. "Accurate Results" are essential in business life. A mere knowledge of methods will not do; accurate results must be obtained. The invoice clerk must not only know the methods used in extending invoices, he must get results—correct results at that. An office clerk must not only know a method for finding the interest or discount on a note or draft, he must get results and none but absolutely correct results will do. The same is true of business arithmetic in all its branches and it should always be considered an essential feature of all arithmetical calculations.

ADDITION.

Methods of practice are here suggested such as will produce rapid and accurate results.

In the pages of figures following, note the horizontal lines are numbered and the vertical lines or columns lettered.

As the small numbers must be mastered before larger ones are attempted, begin with the first page of figures. To each of the numbers in line two, add the number in the same column in line one, and add column by column from left to right and from right to left. Continue practice in this way by adding the numbers of any two consecutive lines. When accuracy and rapidity are secured in adding two lines, drill in three consecutive lines, in four, in five and so on, until the whole of the columns can be added correctly and without hesitancy. Then follow page by page and practise until the sevens, the eights and nines are added as readily as the ones and twos.

When a number are practising together, good results can be obtained by adding in unison, using a metronome to mark the time or by one gently tapping with a pencil. Increase the speed from time to time as proficiency is reached. For other practice work, countless numbers of combinations may be indicated as follows:—

Page 5, columns A to G, lines 1 to 12, inclusive.

Page 5, columns J to N, lines 6 to 18, “

Page 7, columns E to J, lines 4 to 11, “

Page 5, columns K to O, lines 1 to 25, “

Narrow strips of paper, card or bristol board may be used as guides by laying them on the outside bounds of the columns and lines indicated.

One should practise adding from left to right and from right to left, as well as upwards and downwards.

PRACTISE PAGE

5

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WRIGHT'S RAPID CALCULATOR

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WRIGHT'S RAPID CALCULATOR

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PRACTISE PAGE

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WRIGHT'S RAPID CALCULATOR

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12	4	2	5	3	5	4	3	2	6	5	2	4	3	6	5	12
13	3	4	5	2	3	2	6	4	3	7	5	7	4	5	3	13
14	6	7	3	7	4	6	5	6	4	2	3	7	5	6	4	14
15	3	3	2	4	5	3	5	3	4	8	5	3	6	3	6	15
16	5	4	7	3	2	6	4	5	3	2	6	5	4	3	2	16
17	5	4	3	8	4	2	6	3	5	6	7	4	3	7	6	17
18	4	7	5	2	7	5	3	4	6	5	3	7	4	2	5	18
19	6	2	3	4	2	6	4	5	3	7	5	6	5	4	3	19
20	2	7	4	3	5	2	7	4	6	3	2	4	3	2	6	20
21	7	4	3	4	6	7	3	4	2	6	7	3	5	4	7	21
22	6	9	4	3	7	4	2	6	5	3	7	5	4	6	2	22
23	4	5	7	4	6	7	5	3	7	4	6	5	7	5	7	23
24	3	5	4	6	2	3	7	4	7	5	6	7	5	7	7	24
25	6	2	3	7	5	4	2	7	5	6	3	2	3	2	5	25
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	

PRACTISE PAGE

11

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	
1	4	7	3	8	4	6	7	5	8	3	7	4	6	5	7	1
2	5	2	6	7	4	5	3	8	4	6	4	5	7	4	5	2
3	6	4	7	3	5	4	6	2	7	5	4	3	6	5	4	3
4	7	5	4	6	2	3	4	5	2	6	7	5	3	2	7	4
5	6	5	3	2	7	4	3	6	4	3	7	4	6	8	2	5
6	5	4	6	7	8	5	8	6	7	5	8	3	7	5	8	6
7	6	7	5	7	3	8	2	7	6	4	3	7	8	6	4	7
8	7	2	4	6	8	3	7	5	3	6	4	3	5	7	3	8
9	5	7	8	2	4	6	5	3	6	5	8	4	7	3	8	9
10	8	7	3	8	6	5	4	6	7	8	3	7	4	6	3	10
11	7	8	4	6	7	5	3	2	8	6	7	4	3	5	6	11
12	3	7	6	8	5	7	4	8	6	7	5	6	8	3	8	12
13	7	3	8	4	7	8	6	8	3	8	7	6	8	4	7	13
14	6	8	3	7	8	4	6	2	8	3	7	4	8	6	7	14
15	8	2	8	7	3	7	6	4	8	3	6	7	5	8	4	15
16	6	7	4	3	8	4	6	7	3	5	4	6	7	3	8	16
17	5	6	4	8	3	7	5	4	7	2	3	6	3	8	2	17
18	7	4	3	6	8	3	7	5	4	6	7	3	2	8	4	18
19	7	5	6	7	5	4	3	8	8	7	4	8	6	3	7	19
20	3	7	5	8	6	4	7	8	5	4	6	2	8	2	5	20
21	4	3	8	6	8	5	4	2	6	5	3	7	4	8	2	21
22	6	4	3	8	2	7	5	6	3	8	4	7	6	3	8	22
23	2	7	8	3	5	6	5	7	3	8	2	6	4	3	7	23
24	8	2	6	5	5	3	2	4	7	6	8	5	8	4	3	24
25	6	8	2	4	7	5	8	7	2	4	6	3	3	5	8	25
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	

WRIGHT'S RAPID CALCULATOR

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	
1	7	3	9	2	8	6	5	9	4	7	6	9	5	7	6	1
2	9	8	4	9	6	8	4	9	3	7	6	9	4	8	7	2
3	6	9	4	8	7	3	9	4	6	8	7	4	6	9	2	3
4	4	9	7	4	6	9	1	7	5	6	9	5	3	7	8	4
5	7	4	6	8	3	9	4	6	7	4	7	6	9	3	8	5
6	5	7	4	9	8	7	5	7	3	8	4	6	7	9	8	6
7	3	9	4	6	2	9	6	8	4	7	3	5	7	2	9	7
8	7	2	9	5	6	7	5	3	8	4	9	2	8	6	7	8
9	8	9	5	8	6	9	4	8	3	7	6	9	3	8	4	9
10	6	3	9	4	7	6	5	3	9	4	8	6	7	2	4	10
11	7	5	9	3	8	2	5	6	7	8	4	3	8	6	9	11
12	7	4	1	7	3	8	2	5	9	7	9	6	7	9	4	12
13	5	8	6	8	7	4	3	7	1	6	8	4	9	3	7	13
14	6	4	7	5	7	4	9	3	7	3	8	2	6	5	4	14
15	7	5	4	9	3	6	8	7	9	6	4	8	3	7	6	15
16	7	4	9	3	7	4	8	6	7	9	5	3	9	4	8	16
17	6	9	4	8	7	5	3	7	4	6	9	8	7	5	3	17
18	7	2	9	5	7	6	8	3	9	4	7	6	7	3	4	18
19	3	8	2	7	3	7	1	6	4	5	3	8	9	6	7	19
20	9	2	7	4	8	3	9	4	6	8	3	7	6	9	5	20
21	8	4	7	3	9	4	8	3	6	7	4	9	5	8	3	21
22	6	7	5	4	9	3	8	4	7	9	6	8	5	7	4	22
23	7	3	2	9	4	6	8	2	7	8	6	9	7	4	8	23
24	6	9	5	7	5	4	3	8	2	6	7	9	4	9	6	24
25	9	3	9	4	9	7	9	8	9	5	9	6	9	4	9	25
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	

Much repetition and consequently much time may be saved if instead of repeating the tens each time a succeeding number is added, the tens be spoken but once. Thus when one is adding by 3's and twenty-one is reached, instead of saying twenty-one, twenty-four, twenty-seven, thirty, thirty-three, thirty-six, thirty-nine, say twenty-one-four-seven, thirty-three-six-nine and so on, the tens being carried in the head after once spoken.

To prove additions add columns in the opposite direction to what you added previously, that is, if you added upwards before, now add downwards, or if downwards before, now add upwards.

SUBTRACTION.

The same pages of figures as used in addition may be used for practice drills and exercises in subtraction.

Take any two consecutive lines and take the differences between the numbers in the same columns, working backwards and forwards from left to right or from right to left. First take the smaller number from the greater, irrespective of which may be found in the upper column; afterwards when the upper number is smaller, add 10 to it and subtract the lower. Follow this by borrowing in the usual way as occasion requires.

Practise drills may be arranged as follows:—

Page 8, from line 5 take line 6, columns A to H.

Page 9, from line 8 take line 9, columns G to M.

Page 10, from line 14 take line 15, columns A to G.
columns H to O.

The only precaution that need be taken is to have the left-hand figure of the upper line of higher degree than that of the lower one. One cannot take 5 from 3, nor 537 from 398.

WRIGHT'S RAPID CALCULATOR

$$4 \times 10^x \div 10^x \text{ sufficient}$$

MULTIPLICATION.

The ability to add accurately and rapidly will be found of great service when one comes to multiplication, which is but "addition abbreviated." Another requisite to good work in multiplication is a thorough mastery of the "Multiplication Tables." In studying these, the preceding pages of figures can again be used to good advantage. Suppose one is learning "four times." Commencing with page 5, drill in multiplying the figures in the different lines until familiarity with these is acquired. Then the next page introducing threes may be taken and so on with each subsequent page until all are mastered even as high as 25 times nine, which is desirable.

Where a number are practising together the plan of working in unison may again be followed with good results, time being marked the same way as before.

After the tables are thoroughly learned, questions for practice work may be indicated as follows:

Page 7, line 9, columns A to K $\times$ 6.

Page 9, line 15, columns L to O $\times$ 78.

Page 11, line 19, columns G to M $\times$ 9674.

DIVISION.

In the practice of division questions, again use the preceding pages of figures and indicate practice work as follows:

Page 9, line 10, columns A to J $\div$ 4.

Page 9, line 16, columns E to O $\div$ 67.

Page 10, line 25, columns A to O $\div$ 3892.

SHORT METHODS IN MULTIPLICATION.

Remember one should not try any of the short methods until proficiency is attained in the ordinary way, then they may be used to great advantage, often enabling one to do in the head easily, quickly, and correctly that which would otherwise make the use of pen or pencil necessary. In many cases the work can be shortened by half.

To multiply two numbers of two digits each, whose tens figures are the same and the sum of whose units is 10.

Example: $62 \times 68 = 4216$. $= 60 \times 70 = 4200 - 4$

Multiply the units figures 2 and 8 for the two right figures of the product; multiply the tens figure 6 by the digit higher, 7, thus $6 \times 7 = 42$, which gives us the two or two left hand figures.

EXERCISE 1.

- | | | | |
|--------------------|---------------------|---------------------|---------|
| (1) 25×25 | (9) 32×38 | (17) 93×97 | (25) 41 |
| (2) 35×35 | (10) 92×98 | (18) 63×67 | (26) 31 |
| (3) 55×55 | (11) 82×88 | (19) 74×76 | (27) 71 |
| (4) 65×65 | (12) 52×58 | (20) 54×56 | (28) 81 |
| (5) 95×95 | (13) 73×77 | (21) 84×86 | (29) 61 |
| (6) 85×85 | (14) 43×47 | (22) 64×66 | (30) |
| (7) 62×68 | (15) 53×57 | (23) 74×76 | |
| (8) 72×78 | (16) 83×87 | (24) 94×96 | |

To multiply two numbers of two digits each, whose units are the same and the sum of whose tens is 10.

Example: $67 \times 47 = 3149$. $(60 + 40) \times 7$

Multiply the units figures $7 \times 7 = 49$; which gives the two right hand figures of the answer; now multiply the tens figures $6 \times 4 = 24$; and add the units figure 7 giving 31 as the remaining two figures of the answer.

EXERCISE 2.

- | | | | |
|----------------------|---------------------|---------------------|---------------------|
| (1) 22×82 | (9) 56×56 | (17) 78×38 | (25) 58×58 |
| (2) 49×69 | (10) 13×93 | (18) 26×86 | (26) 27×87 |
| (3) 57×57 ✓ | (11) 94×14 | (19) 53×53 | (27) 44×64 |
| (4) 35×75 | (12) 52×52 | (20) 39×79 | (28) 28×88 |
| (5) 19×99 ✓ | (13) 29×89 | (21) 46×66 | (29) 76×36 |
| (6) 43×63 | (14) 42×62 | (22) 33×73 | (30) 24×84 |
| (7) 61×41 ✓ | (15) 37×77 | (23) 45×65 | |
| (8) 48×68 | (16) 25×85 | (24) 34×74 | |

To multiply any two numbers of two digits each, whose tens figures are the same.

Example: $37 \times 32 = 1184$.

Multiply the units figures, $7 \times 2 = 14$; set down the 4 and carry 1; add the two units figures, 7 plus 2 = 9 and multiply by the tens figure 3, giving us 27; to this add the 1 carried making 28; put down 8 as the second or tens figure of your answer and carry 2; now multiply the tens figures, $3 \times 3 = 9$, add carrying figure 2 and we get 11, the remaining figures of our answer.

$$\begin{array}{r} 37 \times 32 \\ 7 \times 2 = 14 \\ 30 \times 2 = 60 \\ 37 \times 3 = 111 \\ \hline 1184 \end{array}$$

EXERCISE 3.

- | | | | |
|----------------------|---------------------|---------------------|---------------------|
| (1) 37×34 ✓ | (9) 84×89 | (17) 85×87 | (25) 92×96 |
| (2) 47×43 ✓ | (10) 66×67 | (18) 75×76 | (26) 94×97 |
| (3) 54×53 | (11) 56×55 | (19) 82×83 | (27) 98×96 |
| (4) 65×67 | (12) 47×42 | (20) 73×79 | (28) 97×94 |
| (5) 75×73 | (13) 37×39 | (21) 69×63 | (29) 99×94 |
| (6) 87×82 | (14) 46×49 | (22) 55×58 | (30) 95×99 |
| (7) 92×91 | (15) 64×67 | (23) 67×68 | |
| (8) 73×78 | (16) 92×99 | (24) 35×32 | |

To multiply any two numbers of two digits each, whose units figures are the same.

Example: $89 \times 59 = 5251$.

Multiply the units figures $9 \times 9 = 81$; put down 1 and carry 8; add the tens figures 8 plus 5 = 13 and multiply by units figure 9 giving 117; add carrying figure 8, making 125; put down 5 as the second or tens figure of the answer and carry 12; now multiply the tens figures, $8 \times 5 = 40$ and add 12, giving 52, the remaining two figures of the answer.

EXERCISE 4.

- | | | | |
|--------------------|---------------------|---------------------|---------------------|
| (1) 34×54 | (9) 56×36 | (17) 59×79 | (25) 91×31 |
| (2) 45×35 | (10) 57×87 | (18) 42×82 | (26) 73×53 |
| (3) 72×62 | (11) 38×98 | (19) 53×83 | (27) 55×95 |
| (4) 58×78 | (12) 29×89 | (20) 99×39 | (28) 47×87 |
| (5) 97×67 | (13) 46×76 | (21) 22×82 | (29) 78×38 |
| (6) 69×39 | (14) 98×58 | (22) 57×47 | (30) 29×79 |
| (7) 54×84 | (15) 73×93 | (23) 49×89 | |
| (8) 75×65 | (16) 88×68 | (24) 26×86 | |

To multiply by any number of two digits the units figure of which is 1.

Example: 3986×61 .

Set down the right hand figure of the multiplicand as the right hand figure of your answer. Multiply this same figure and each succeeding figure to the left in turn by the tens figure of your multiplier, add the carrying figure and the one to the left of the one being multiplied until the end is reached. In the example above, the right hand figure of the multiplicand and consequently of the answer is 6.

$6 \times 6 + 8 = 44$; write 4 and carry 4. $8 \times 6 + 4 + 9 = 61$; write 1 and carry 6. $9 \times 6 + 6 + 3 = 63$; write 3 and carry 6; $3 \times 6 + 6 = 24$. Write 24. The answer is therefore 243146.

EXERCISE 5.

- | | | |
|---------------------|------------------------|--------------------------|
| (1) 729×41 | (6) 37546×31 | (11) 7946384×41 |
| (2) 926×61 | (7) 92783×61 | (12) 3968275×71 |
| (3) 754×81 | (8) 79438×91 | (13) 7294638×91 |
| (4) 356×71 | (9) 72963×51 | (14) 9428374×61 |
| (5) 629×91 | (10) 39274×51 | (15) 5763948×81 |

✓ To multiply any number by one or more 9's.

Example: 72946×999 .

72946000

72946

72873054

To the multiplicand 72946 add as many ciphers as there are 9's in the multiplier, in this case 3. Under the number thus obtained 72946000 place the multiplicand itself 72946 and subtract, the remainder is the desired product.

EXERCISE 6.

- | | |
|--------------------------|---------------------------|
| (1) 47635×9 | (6) 382946752×9 |
| (2) 95238×99 | (7) 76439864×99 |
| (3) 38697×999 | (8) 6879568×999 |
| (4) 93725×9999 | (9) 759685×9999 |
| (5) 38927×99999 | (10) 68395×99999 |

ADDITION OF FRACTIONS.

Example: $\frac{1}{3} + \frac{2}{9} + \frac{16}{27} = \frac{9}{27} + \frac{6}{27} + \frac{16}{27} = \frac{31}{27} = 1\frac{4}{27}$ Ans.

To add fractional parts of a unit together, first reduce the fractions to equivalent ones with a common denominator, usually the least possible. In this case denominators 3 and 9 are both factors of denominator 27, so that the common denominator will be 27.

$\frac{1}{3}$ equals as many 27ths as 3 is contained in 27 or $\frac{9}{27}$; $\frac{2}{9}$ equals as many 27ths as 9 is contained in 27 or $\frac{6}{27}$, and $\frac{16}{27}$ equals $\frac{16 \times 1}{27}$, or $\frac{16}{27}$. Now by taking $\frac{9}{27} + \frac{6}{27} + \frac{16}{27}$ and adding the numerators 9, 6 and 16 together, 31 is obtained and the answer written $\frac{31}{27}$; as $\frac{27}{27}$ represents a unit, take this away from $\frac{31}{27}$ and $\frac{4}{27}$ is left, and the answer is $1\frac{4}{27}$.

EXERCISE 7.

- | | | |
|------------------------------------|--|--|
| (1) $\frac{1}{2} + \frac{3}{4}$. | (6) $\frac{1}{4} + \frac{3}{8} + \frac{5}{16}$. | (11) $\frac{3}{11} + \frac{7}{22} + \frac{17}{44} + \frac{37}{132}$. |
| (2) $\frac{2}{3} + \frac{5}{6}$. | (7) $\frac{2}{7} + \frac{5}{14} + \frac{17}{42}$. | (12) $\frac{6}{13} + \frac{19}{39} + \frac{73}{78} + \frac{101}{234}$. |
| (3) $\frac{1}{4} + \frac{5}{8}$. | (8) $\frac{3}{5} + \frac{7}{15} + \frac{16}{45}$. | (13) $\frac{7}{17} + \frac{25}{88} + \frac{95}{204} + \frac{301}{812}$. |
| (4) $\frac{2}{3} + \frac{3}{16}$. | (9) $\frac{3}{7} + \frac{9}{14} + \frac{17}{56}$. | (14) $\frac{10}{19} + \frac{23}{57} + \frac{103}{285} + \frac{502}{855}$. |
| (5) $\frac{1}{6} + \frac{5}{12}$. | (10) $\frac{4}{9} + \frac{16}{27} + \frac{59}{81}$. | (15) $\frac{15}{23} + \frac{43}{69} + \frac{101}{207} + \frac{17}{828}$. |

Example 2: $\frac{2}{5} + \frac{7}{15} + \frac{11}{24} = \frac{48 + 56 + 55}{120} = \frac{159}{120} = 1\frac{39}{120}$ or $1\frac{13}{40}$.

In this case note the first denominator 5 is a factor of the second denominator 15, but not of the third, 24, so that any number that will contain 15 will contain 5; for the present drop the 5 from the calculations and consider 15 and 24 only. These have a common factor 3, by which divide them thus, $\frac{15}{3} = 5$, $\frac{24}{3} = 8$; the quotients 5 and 8 have no common factor, so take their product 40 and multiply by the common factor 3, getting 120 as the least common denominator; from this point proceed as in example 1.

EXERCISE 8.

- (1) $\frac{1}{2} + \frac{1}{4} + \frac{1}{6} + \frac{1}{8}$.
- (2) $\frac{1}{3} + \frac{2}{5} + \frac{3}{6} + \frac{4}{15}$.
- (3) $\frac{2}{3} + \frac{3}{4} + \frac{1}{6} + \frac{2}{9}$.
- (4) $\frac{3}{4} + \frac{1}{5} + \frac{1}{6} + \frac{1}{12}$.
- (5) $\frac{5}{6} + \frac{1}{3} + \frac{1}{4} + \frac{2}{5}$.
- (6) $\frac{7}{15}$ bus. + $\frac{1}{2}$ bus. + $\frac{1}{3}$ bus. + $\frac{2}{3}$ bus. + $\frac{3}{4}$ bus.
- (7) $\frac{2}{3}$ lbs. + $\frac{1}{3}$ lbs. + $\frac{1}{6}$ lbs. + $\frac{3}{4}$ lbs. + $\frac{5}{6}$ lbs.
- (8) $\frac{1}{2}$ oz. + $\frac{2}{3}$ oz. + $\frac{3}{8}$ oz. + $\frac{4}{5}$ oz. + $\frac{5}{6}$ oz.
- (9) $\frac{1}{2}$ yds. + $\frac{1}{3}$ yds. + $\frac{1}{4}$ yds. + $\frac{1}{5}$ yds. + $\frac{3}{5}$ yds.
- (10) $\frac{3}{4}$ ft. + $\frac{1}{2}$ ft. + $\frac{2}{3}$ ft. + $\frac{1}{4}$ ft. + $\frac{5}{6}$ ft.

Example 3: $7\frac{1}{2} + 9\frac{5}{12} + 14\frac{1}{2}$; $\frac{1}{2} + \frac{5}{12} + \frac{1}{2} = \frac{6}{12} + \frac{5}{12} + \frac{6}{12} = 1\frac{17}{12}$;
 $1 + 7 + 9 + 14 = 31$. Answer is $31\frac{17}{12}$.

In adding mixed numbers similar to the above add the fractions first as in example 2, then add the units of the result and the whole numbers together. By adding the fractions $\frac{1}{2}$, $\frac{5}{12}$ and $\frac{1}{2}$ in the above example, $1\frac{17}{12}$ is obtained. Now add 1 and the other whole numbers 7, 9 and 14 together, and the result is 31; the answer is therefore $31\frac{17}{12}$.

EXERCISE 9.

- (1) $3\frac{1}{2} + 7\frac{1}{3} + 9\frac{1}{6}$.
- (2) $17\frac{1}{2} + 19\frac{1}{4} + 21\frac{1}{10}$.
- (3) $25\frac{6}{7} + 32\frac{1}{2} + 45\frac{2}{3}$.
- (4) $36\frac{2}{3} + 47\frac{1}{3} + 91\frac{4}{5}$.
- (5) $65\frac{3}{4} + 74\frac{1}{2} + 87\frac{1}{10}$.
- (6) $87\frac{1}{4} + 95\frac{1}{2} + 107\frac{3}{4} + 113\frac{5}{6} + 137\frac{7}{8}$.
- (7) $92\frac{1}{6} + 97\frac{1}{4} + 115\frac{1}{2} + 126\frac{3}{5} + 145\frac{1}{15}$.
- (8) $112\frac{1}{7} + 117\frac{2}{3} + 126\frac{3}{5} + 137\frac{1}{10} + 156\frac{1}{12}$.
- (9) $115\frac{1}{2} + 127\frac{2}{3} + 194\frac{1}{3} + 199\frac{1}{3} + 204\frac{2}{3}$.
- (10) $124\frac{1}{2} + 136\frac{1}{3} + 147\frac{1}{6} + 243\frac{1}{2} + 257\frac{1}{3}$.

SUBTRACTION OF FRACTIONS.

Example: $\frac{5}{9} - \frac{4}{9} = 1\frac{5}{9} - 1\frac{4}{9} = 1\frac{1}{9}$.

Reduce the fractions to equivalent ones with their lowest common denominators $\frac{5}{9} = 1\frac{5}{9}$ and $\frac{4}{9} = 1\frac{4}{9}$; subtract the numerator 4 from 5, which leaves 1; the answer is therefore $1\frac{1}{9}$.

In subtracting mixed numbers, after taking the difference between the fractions, subtract the whole numbers; the fraction and the whole number thus obtained is the result desired.

Example 2: $7\frac{8}{9} - 4\frac{7}{9}$.

$\frac{8}{9} = 1\frac{0}{9}$; $1\frac{7}{9} = 2\frac{1}{9}$; $1\frac{0}{9} - 2\frac{1}{9} = 1\frac{9}{9}$ the difference between the fractions; $7 - 4 = 3$ the difference between the whole numbers; place these differences together as $3\frac{1}{9}$ and the result required is obtained.

EXERCISE 10.

- | | | |
|--------------------------------------|--|--|
| (1) $\frac{3}{5} - \frac{1}{5}$. | (6) $3\frac{1}{7} - 1\frac{1}{9}$. | (11) $15\frac{1}{15} - 12\frac{7}{18}$. |
| (2) $1\frac{1}{3} - \frac{4}{9}$. | (7) $5\frac{4}{5} - 3\frac{2}{7}$. | (12) $134\frac{5}{8} - 39\frac{3}{4}$. |
| (3) $1\frac{3}{8} - 1\frac{7}{8}$. | (8) $7\frac{3}{4} - 3\frac{5}{12}$. | (13) $78\frac{4}{5} - 27\frac{2}{5}$. |
| (4) $1\frac{7}{8} - \frac{6}{7}$. | (9) $28\frac{3}{4} - 15\frac{1}{8}$. | (14) $147\frac{5}{8} - 101\frac{4}{8}$. |
| (5) $1\frac{1}{7} - 1\frac{7}{35}$. | (10) $32\frac{2}{5} - 27\frac{3}{4}$. | (15) $150\frac{7}{9} - 97\frac{1}{9}$. |

Sometimes the fraction of the subtrahend or lesser number is greater than that of minuend or greater of the two mixed numbers, in which case proceed as follows:

Example 3: $17\frac{1}{8} - 12\frac{1}{8}$.

Taking the fractions $\frac{1}{8}$ and $\frac{1}{8}$, reduce them to equivalent ones with the least common denominator and the result is $\frac{1}{8}$; as one cannot take $\frac{1}{8}$ from $\frac{1}{8}$, borrow a unit or $\frac{8}{8}$ from the whole number 17, add the $\frac{8}{8}$ and the $\frac{1}{8}$ borrowed and the result is $\frac{9}{8}$; from this take $\frac{1}{8}$; $\frac{9}{8} - \frac{1}{8} = \frac{8}{8} = 1$.

thus obtaining the fractional part of the answer; subtract the whole number 12 from 16 ($17 - 1$) and 4 is left as the remaining part of the answer; the whole answer is therefore $4\frac{10}{11}$.

EXERCISE 11.

- | | |
|---|--|
| (1) $7\frac{1}{9} - 5\frac{1}{9}$. | (6) $132\frac{1\frac{2}{3}}{1\frac{2}{3}} - 109\frac{1\frac{1}{3}}{1\frac{1}{3}}$. |
| (2) $13\frac{1}{6} - 9\frac{5}{6}$. | (7) $147\frac{1\frac{2}{3}}{1\frac{2}{3}} - 96\frac{1\frac{5}{6}}{1\frac{5}{6}}$. |
| (3) $17\frac{1\frac{1}{2}}{1\frac{1}{2}} - 12\frac{1\frac{5}{6}}{1\frac{5}{6}}$. | (8) $216\frac{1\frac{1}{2}}{1\frac{1}{2}} - 177\frac{2\frac{2}{3}}{2\frac{2}{3}}$. |
| (4) $25\frac{1\frac{5}{6}}{1\frac{5}{6}} - 17\frac{1\frac{1}{2}}{1\frac{1}{2}}$. | (9) $342\frac{2\frac{5}{6}}{2\frac{5}{6}} - 189\frac{3\frac{2}{3}}{3\frac{2}{3}}$. |
| (5) $37\frac{2\frac{2}{3}}{2\frac{2}{3}} - 28\frac{1\frac{1}{2}}{1\frac{1}{2}}$. | (10) $410\frac{3\frac{2}{3}}{3\frac{2}{3}} - 237\frac{4\frac{1}{2}}{4\frac{1}{2}}$. |

Short method of adding and subtracting fractions having 1 as a common numerator.

Example: $\frac{1}{7} + \frac{1}{9} = \frac{7+9}{7 \times 9} = \frac{16}{63}$.

For the numerator of the answer add the two denominators 7 and 9 together, which yields 16. For the denominator of the answer multiply the two denominators 7 and 9 together, which gives 63. The answer is therefore $\frac{16}{63}$.

EXERCISE 12.

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|-------------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|
| (1) $\frac{1}{2} - \frac{1}{11}$. | (6) $\frac{1}{15} + \frac{1}{16}$. | (11) $\frac{1}{18} + \frac{1}{19}$. | (16) $\frac{1}{22} + \frac{1}{23}$. |
| (2) $\frac{1}{9} - \frac{1}{13}$. | (7) $\frac{1}{16} + \frac{1}{17}$. | (12) $\frac{1}{19} + \frac{1}{20}$. | (17) $\frac{1}{24} + \frac{1}{25}$. |
| (3) $\frac{1}{11} + \frac{1}{12}$. | (8) $\frac{1}{12} + \frac{1}{13}$. | (13) $\frac{1}{20} + \frac{1}{21}$. | (18) $\frac{1}{25} + \frac{1}{26}$. |
| (4) $\frac{1}{14} + \frac{1}{15}$. | (9) $\frac{1}{13} + \frac{1}{14}$. | (14) $\frac{1}{24} + \frac{1}{25}$. | (19) $\frac{1}{26} + \frac{1}{27}$. |
| (5) $\frac{1}{17} + \frac{1}{18}$. | (10) $\frac{1}{16} + \frac{1}{17}$. | (15) $\frac{1}{25} + \frac{1}{26}$. | (20) $\frac{1}{27} + \frac{1}{28}$. |

To find the sum of $\frac{3}{4}$ and $\frac{5}{7}$.

Cross multiply and add the products thus, $3 \times 7 + 4 \times 5 = 21 + 20$, or 41, the numerator of the answer. The product of the two denominators 4 and 7, or 28, will be the new denominator. The answer is $\frac{41}{28}$, or $1\frac{13}{28}$.

EXERCISE 13.

- | | |
|------------------------------------|---------------------------------------|
| (1) $\frac{2}{3} + \frac{4}{5}$. | (6) $\frac{5}{9} + \frac{7}{12}$. |
| (2) $\frac{3}{4} + \frac{3}{7}$. | (7) $\frac{6}{13} + \frac{11}{15}$. |
| (3) $\frac{4}{5} + \frac{6}{11}$. | (8) $\frac{7}{16} + \frac{3}{26}$. |
| (4) $\frac{5}{7} + \frac{7}{8}$. | (9) $\frac{9}{26} + \frac{7}{25}$. |
| (5) $\frac{2}{9} + \frac{3}{13}$. | (10) $\frac{19}{27} + \frac{9}{46}$. |

To subtract Fractions.

The difference between $\frac{1}{7}$ and $\frac{1}{9}$ is $\frac{9-7}{7 \times 9}$, or $\frac{2}{63}$.

Subtract the denominators 7 from 9 and get the new numerator 2, multiply the denominators 7 and 9 and get the new denominator 63. The answer is therefore $\frac{2}{63}$.

EXERCISE 14.

- | | | | |
|-----------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|
| (1) $\frac{1}{5} - \frac{1}{4}$. | (6) $\frac{1}{7} - \frac{1}{9}$. | (11) $\frac{1}{17} - \frac{1}{26}$. | (16) $\frac{1}{34} - \frac{1}{56}$. |
| (2) $\frac{1}{4} - \frac{1}{5}$. | (7) $\frac{1}{9} - \frac{1}{11}$. | (12) $\frac{1}{19} - \frac{1}{26}$. | (17) $\frac{1}{42} - \frac{1}{48}$. |
| (3) $\frac{1}{5} - \frac{1}{8}$. | (8) $\frac{1}{11} - \frac{1}{12}$. | (13) $\frac{1}{26} - \frac{1}{23}$. | (18) $\frac{1}{53} - \frac{1}{57}$. |
| (4) $\frac{1}{6} - \frac{1}{7}$. | (9) $\frac{1}{12} - \frac{1}{13}$. | (14) $\frac{1}{36} - \frac{1}{43}$. | (19) $\frac{1}{81} - \frac{1}{89}$. |
| (5) $\frac{1}{7} - \frac{1}{8}$. | (10) $\frac{1}{13} - \frac{1}{15}$. | (15) $\frac{1}{37} - \frac{1}{46}$. | (20) $\frac{1}{94} - \frac{1}{96}$. |

To find the difference between $\frac{5}{7}$ and $\frac{7}{9}$.

Cross multiply and take the difference between the products $(7 \times 7) - (5 \times 9) = 49 - 45$, or 4, the numerator of the answer; the product of the denominators 7 and 9, 63, is the new denominator, and the answer is $\frac{4}{63}$.

EXERCISE 15.

Find the difference between:

- | | |
|---|--|
| (1) $\frac{2}{5}$ and $\frac{3}{11}$. | (6) $\frac{7}{13}$ and $\frac{5}{14}$. |
| (2) $\frac{3}{4}$ and $\frac{5}{7}$. | (7) $\frac{6}{17}$ and $\frac{5}{19}$. |
| (3) $\frac{4}{9}$ and $\frac{7}{12}$. | (8) $\frac{11}{18}$ and $\frac{7}{21}$. |
| (4) $\frac{7}{11}$ and $\frac{4}{13}$. | (9) $\frac{13}{17}$ and $\frac{11}{26}$. |
| (5) $\frac{8}{9}$ and $\frac{9}{16}$. | (10) $\frac{15}{22}$ and $\frac{17}{36}$. |

MULTIPLICATION OF FRACTIONS.

The multiplication of whole numbers by fractions or of fractions by whole numbers is effected by multiplying the numerator by the whole number and dividing their product by the denominator of the fraction.

Example: $78 \times \frac{3}{7} = \frac{78 \times 3}{7} = \frac{234}{7}$ or $33\frac{3}{7}$ Ans.

Or $\frac{7}{8} \times 15 = \frac{7 \times 15}{8} = \frac{105}{8}$, or $13\frac{1}{8}$ Ans.

EXERCISE 16.

(1) $96 \times \frac{7}{13}$.

(6) $\frac{13}{17} \times 59$.

(2) $128 \times \frac{19}{20}$.

(7) $\frac{143}{157} \times 48$.

(3) $234 \times \frac{14}{17}$.

(8) $\frac{268}{725} \times 92$.

(4) $185 \times \frac{18}{19}$.

(9) $\frac{1427}{1539} \times 145$.

(5) $279 \times \frac{2}{5}$.

(10) $\frac{1768}{2947} \times 289$.

To multiply a whole number by a mixed number or vice versa.

Multiply the whole number by the fractional part of the mixed number as above; multiply the two whole numbers together and add the products thus obtained.

Example 1: $78 \times 4\frac{3}{4}$; $78 \times \frac{3}{4} = 29\frac{1}{4}$, or $29\frac{1}{4}$; $78 \times 4 = 312$; $29\frac{1}{4} + 312 = 341\frac{1}{4}$ Ans.

Example 2: $782\frac{5}{9} \times 32$; $\frac{5}{9} \times 32 = 17\frac{4}{9}$, or $17\frac{4}{9}$; $782 \times 32 = 25024$; $17\frac{4}{9} + 25024 = 25041\frac{4}{9}$ Ans.

EXERCISE 17.

(1) $124 \times 3\frac{1}{9}$.

(6) $312\frac{1}{7} \times 57$.

(2) $137 \times 7\frac{3}{10}$.

(7) $457\frac{13}{14} \times 68$.

(3) $269 \times 13\frac{14}{19}$.

(8) $574\frac{15}{17} \times 76$.

(4) $653 \times 15\frac{13}{17}$.

(9) $956\frac{23}{24} \times 89$.

(5) $795 \times 27\frac{2}{9}$.

(10) $1976\frac{2}{3} \times 178$.

To multiply one fraction by another.

(1) When the numerators of the different fractions have no factors common with those of the denominators.

Find the product of the numerators for the new numerator and of the denominators for the new denominator and the answer is obtained.

Example: $\frac{3}{7} \times \frac{5}{13} = \frac{3 \times 5}{7 \times 13} = \frac{15}{91}$ Ans.

EXERCISE 18.

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|---|---|
| (1) $\frac{3}{8} \times \frac{7}{11}$. | (6) $\frac{11}{18} \times \frac{19}{20}$. |
| (2) $\frac{5}{9} \times \frac{7}{12}$. | (7) $\frac{37}{56} \times \frac{45}{64}$. |
| (3) $\frac{9}{13} \times \frac{8}{17}$. | (8) $\frac{144}{217} \times \frac{156}{235}$. |
| (4) $\frac{11}{14} \times \frac{9}{16}$. | (9) $\frac{224}{317} \times \frac{234}{439}$. |
| (5) $\frac{4}{19} \times \frac{6}{23}$. | (10) $\frac{379}{478} \times \frac{537}{674}$. |

(2) When the numerators of any of the fractions to be multiplied have factors common with any of the denominators of said fractions, these may be cancelled as in the following example.

$$\frac{3}{7} \times \frac{25}{27} \times \frac{63}{65} = \frac{3}{13}$$

(Note.—When following the explanation mark off the different numbers with your pencil as divided.)

9 will divide into 27, 3 times; 3 will divide into 63, 21 times; 5 will divide into 25, 5 times, and 35, 7 times; 7 will divide into 21, 3 times and 5 will divide into 65, 13 times. If each of these numbers has been struck out as divided we will now have "3" left uncanceled among the numerators and "13" among the denominators. The answer is therefore $\frac{3}{13}$.

EXERCISE 19.

- | | |
|--|--|
| (1) $\frac{7}{5} \times \frac{8}{15} \times \frac{20}{21}$. | (6) $\frac{3}{4} \times \frac{5}{8} \times \frac{8}{9} \times \frac{9}{16}$. |
| (2) $\frac{5}{6} \times \frac{8}{9} \times \frac{9}{10}$. | (7) $\frac{7}{12} \times \frac{25}{27} \times \frac{24}{35} \times \frac{81}{100}$. |
| (3) $\frac{12}{21} \times \frac{24}{25} \times \frac{35}{54}$. | (8) $\frac{15}{16} \times \frac{28}{29} \times \frac{38}{65} \times \frac{91}{108}$. |
| (4) $\frac{16}{17} \times \frac{21}{32} \times \frac{4}{9}$. | (9) $\frac{24}{31} \times \frac{25}{36} \times \frac{62}{75} \times \frac{81}{112}$. |
| (5) $\frac{17}{18} \times \frac{27}{56} \times \frac{91}{102}$. | (10) $\frac{78}{105} \times \frac{120}{143} \times \frac{154}{165} \times \frac{187}{198}$. |

To multiply mixed numbers.

Such as $1\frac{3}{7} \times 3\frac{1}{5} \times 3\frac{3}{5}$.

Reduce the mixed numbers to improper fractions and we have $\frac{10}{7} \times \frac{16}{5} \times \frac{18}{5}$.

Cancel as before and the result obtained is 16.

EXERCISE 20.

- | | |
|--|--|
| (1) $3\frac{3}{5} \times 4\frac{1}{5} \times 5\frac{7}{10}$. | (6) $9\frac{1}{3} \times 7\frac{9}{10} \times 11\frac{1}{2} \times 19\frac{1}{10}$. |
| (2) $4\frac{1}{2} \times 6\frac{2}{3} \times 7\frac{1}{6}$. | (7) $11\frac{1}{6} \times 13\frac{2}{7} \times 19\frac{1}{8} \times 24\frac{1}{2}$. |
| (3) $5\frac{1}{3} \times 7\frac{1}{2} \times 9\frac{1}{4}$. | (8) $13\frac{1}{7} \times 26\frac{3}{11} \times 31\frac{1}{14} \times 47\frac{1}{2}$. |
| (4) $6\frac{2}{7} \times 9\frac{1}{5} \times 11\frac{2}{7}$. | (9) $17\frac{1}{2} \times 25\frac{2}{7} \times 66\frac{1}{2} \times 75\frac{1}{2}$. |
| (5) $9\frac{2}{5} \times 11\frac{1}{5} \times 12\frac{1}{5}$. | (10) $26\frac{1}{2} \times 37\frac{1}{5} \times 49\frac{1}{2} \times 57\frac{3}{4}$. |

DIVISION OF FRACTIONS.

Example: $\frac{1}{2} \div \frac{1}{4} = \frac{1}{2} \times \frac{4}{1} = \frac{4}{2}$, or $1\frac{1}{2}$.

To divide fractions invert the divisor and proceed as in multiplication. In the above example $\frac{1}{2} \div \frac{1}{4}$, the divisor $\frac{1}{4}$, is inverted and we write $\frac{1}{2} \times \frac{4}{1}$; the 4 will cancel 16, 4 times, and the 7 the 21, 3 times; thus obtaining $\frac{4}{3}$ or $1\frac{1}{3}$ as the answer.

EXERCISE 21.

- | | |
|---------------------------------------|---|
| (1) $\frac{3}{7} \div \frac{5}{14}$. | (6) $4\frac{1}{7} \div 1\frac{1}{7}$. |
| (2) $\frac{5}{9} \div \frac{1}{2}$. | (7) $4\frac{7}{12} \div 2\frac{3}{4}$. |
| (3) $\frac{1}{2} \div \frac{1}{15}$. | (8) $19\frac{7}{15} \div 1\frac{3}{4}$. |
| (4) $\frac{2}{3} \div \frac{1}{2}$. | (9) $125\frac{1}{7} \div 15\frac{2}{4}$. |
| (5) $\frac{4}{6} \div \frac{6}{9}$. | (10) $136\frac{1}{2} \div 8\frac{2}{4}$. |

MULTIPLICATION BY SHORT METHODS.

To multiply any number by 10, add one cipher; by 100, add two ciphers; by 1000, add three ciphers, or by any other power of ten by adding as many ciphers as the multiplier contains.

$$729 \times 10 = 7290; 729 \times 100 = 72900; 729 \times 1000 = 729000.$$

To multiply by the aliquot parts of ten proceed as follows:

To multiply by 5, add 0 and divide by 2.

"	"	"	$3\frac{1}{3}$,	"	0,	"	3.
"	"	"	$2\frac{1}{2}$,	"	0,	"	4.
"	"	"	$1\frac{2}{3}$,	"	0,	"	6.
"	"	"	$1\frac{1}{4}$,	"	0,	"	7.
"	"	"	$1\frac{1}{3}$,	"	0,	"	8.
"	"	"	$1\frac{1}{5}$,	"	0,	"	9.

EXERCISE 22.

- | | |
|---|--|
| (1) $7296432 \times 3\frac{1}{3}; 1\frac{1}{4}; 2\frac{1}{2}$. | (6) $8469370 \times 1\frac{2}{3}; 1\frac{1}{4}; 1\frac{1}{5}$. |
| (2) $3968754 \times 1\frac{2}{3}; 2\frac{1}{2}; 1\frac{3}{4}$. | (7) $9382695 \times 1\frac{2}{3}; 1\frac{3}{4}; 2\frac{1}{2}$. |
| (3) $7286743 \times 1\frac{1}{4}; 1\frac{1}{5}; 3\frac{1}{3}$. | (8) $7296488 \times 1\frac{1}{4}; 2\frac{1}{2}; 3\frac{1}{5}$. |
| (4) $3926848 \times 2\frac{1}{2}; 1\frac{1}{4}; 1\frac{2}{3}$. | (9) $2946797 \times 1\frac{2}{3}; 1\frac{1}{4}; 1\frac{3}{5}$. |
| (5) $7938675 \times 1\frac{1}{5}; 2\frac{1}{2}; 1\frac{3}{4}$. | (10) $6794838 \times 1\frac{1}{5}; 2\frac{1}{2}; 1\frac{2}{3}$. |

To multiply by the aliquot parts of 100.

To multiply by 50, add two 0's, and divide by 2.

"	"	"	$33\frac{1}{3}$,	"	two 0's,	"	"	3.
"	"	"	25,	"	two 0's,	"	"	4.
"	"	"	20,	"	two 0's,	"	"	5.
"	"	"	$16\frac{2}{3}$,	"	two 0's,	"	"	6.
"	"	"	$14\frac{2}{7}$,	"	two 0's,	"	"	7.
"	"	"	$12\frac{1}{2}$,	"	two 0's,	"	"	8.
"	"	"	$11\frac{1}{9}$,	"	two 0's,	"	"	9.
"	"	"	$8\frac{1}{3}$,	"	two 0's,	"	"	12.
"	"	"	$6\frac{1}{4}$,	"	two 0's,	"	"	16.

EXERCISE 23.

Multiply

- (1) 6 by $33\frac{1}{3}$; 50; $16\frac{2}{3}$; 25; 50.
- (2) 12 by $16\frac{2}{3}$; $8\frac{1}{3}$; 25; $12\frac{1}{2}$; $33\frac{1}{3}$.
- (3) 28 by $14\frac{2}{7}$; $12\frac{1}{2}$; $11\frac{1}{9}$; 25; 20.
- (4) 54 by $11\frac{1}{9}$; $16\frac{2}{3}$; $33\frac{1}{3}$; 50; $8\frac{1}{3}$.
- (5) 68 by $12\frac{1}{2}$; 25; $33\frac{1}{3}$; 50; $6\frac{1}{4}$.
- (6) 128 by $6\frac{1}{4}$; $8\frac{1}{3}$; $9\frac{1}{11}$; 20; 25.
- (7) 176 by 25; $33\frac{1}{3}$; $14\frac{2}{7}$; $16\frac{2}{3}$; $12\frac{1}{2}$.
- (8) 216 by $16\frac{2}{3}$; $9\frac{1}{11}$; $6\frac{1}{4}$; $12\frac{1}{2}$; 20.
- (9) 372 by $11\frac{1}{9}$; $8\frac{1}{3}$; 25; $33\frac{1}{3}$; 50.
- (10) 456 by $12\frac{1}{2}$; $6\frac{1}{4}$; 25; $8\frac{1}{3}$; $14\frac{2}{7}$.
- (11) 527 by $33\frac{1}{3}$; $12\frac{1}{2}$; $9\frac{1}{11}$; $11\frac{1}{9}$; $8\frac{1}{3}$.
- (12) 726 by $14\frac{2}{7}$; $16\frac{2}{3}$; 20; 25; $33\frac{1}{3}$.
- (13) 524 by $8\frac{1}{3}$; $12\frac{1}{2}$; $6\frac{1}{4}$; $33\frac{1}{3}$; 50.
- (14) 924 by $11\frac{1}{9}$; $9\frac{1}{11}$; $14\frac{2}{7}$; $16\frac{2}{3}$; $12\frac{1}{2}$.
- (15) 1126 by 20; 25; $33\frac{1}{3}$; $16\frac{2}{3}$; 50.
- (16) 1244 by $33\frac{1}{3}$; 50; $12\frac{1}{2}$; $16\frac{2}{3}$; 25.

To multiply by

$66\frac{1}{3}$, add two 0's, and subtract $\frac{1}{3}$ of the product.

75	“	two 0's,	“	$\frac{1}{4}$	“	“
83 $\frac{1}{3}$	“	two 0's,	“	$\frac{1}{5}$	“	“
85 $\frac{2}{3}$	“	two 0's,	“	$\frac{1}{7}$	“	“
87 $\frac{1}{2}$	“	two 0's,	“	$\frac{1}{8}$	“	“
88 $\frac{4}{9}$	“	two 0's,	“	$\frac{1}{9}$	“	“

EXERCISE 24.

- | | |
|---|--|
| (1) $72968346 \times 66\frac{1}{3}$; $87\frac{1}{2}$. | (6) $92856375 \times 88\frac{1}{3}$; $87\frac{1}{2}$. |
| (2) 93876543×75 ; $88\frac{1}{3}$. | (7) $39268475 \times 66\frac{2}{3}$; $85\frac{2}{3}$. |
| (3) $79268496 \times 83\frac{1}{3}$; $66\frac{2}{3}$. | (8) $72956898 \times 83\frac{1}{3}$; 75 . |
| (4) $94867395 \times 85\frac{2}{3}$; 75 . | (9) 39472686×75 ; $66\frac{2}{3}$. |
| (5) $89476832 \times 87\frac{1}{2}$; $83\frac{1}{3}$. | (10) $32796872 \times 87\frac{1}{2}$; $83\frac{1}{3}$. |

To multiply a number by $37\frac{1}{2}$.

Example: $9376 \times 37\frac{1}{2}$.

Break up the multiplier into two parts 25 and $12\frac{1}{2}$.

$$9376 \times 25 = 937600 \div 4, \text{ or } \dots\dots\dots 234400$$

$$9376 \times 12\frac{1}{2} \text{ or } \frac{1}{2} \text{ of } 25 = \frac{1}{2} \text{ of } 234400 = 117200$$

Now add the product and $\dots\dots\dots 351600$ is the desired result.

Correct results may be obtained in a similar manner in multiplying by the following numbers if broken up as indicated.

$$37\frac{1}{2} = 25 + 12\frac{1}{2} \text{ or } (\frac{1}{2} \text{ of } 25).$$

$$27\frac{1}{2} = 25 + 2\frac{1}{2} \text{ or } (\frac{1}{10} \text{ of } 25).$$

$$22\frac{1}{2} = 25 - 2\frac{1}{2} \text{ or } (\frac{1}{10} \text{ of } 25).$$

$$35 = 25 + 10.$$

$$18\frac{3}{4} = 12\frac{1}{2} + 6\frac{1}{4} \text{ or } (\frac{1}{2} \text{ of } 12\frac{1}{2}).$$

$$15 = 10 + 5 \text{ or } (\frac{1}{2} \text{ of } 10).$$

$$17\frac{1}{2} = 10 + 5 \text{ or } (\frac{1}{2} \text{ of } 10) + 2\frac{1}{2} \text{ or } (\frac{1}{2} \text{ of } 5) \text{ or } (\frac{1}{4} \text{ of } 10).$$

$$32\frac{1}{2} = 20 + 12\frac{1}{2}.$$

$$45 = 50 - 5 \text{ or } (\frac{1}{10} \text{ of } 50).$$

$$47\frac{1}{2} = 50 - 2\frac{1}{2} \text{ or } (\frac{1}{20} \text{ of } 50).$$

$$52\frac{1}{2} = 50 + 2\frac{1}{2} \text{ or } (\frac{1}{20} \text{ of } 50) \text{ or } (\frac{1}{4} \text{ of } 10).$$

$$55 = 50 + 5 \text{ or } (\frac{1}{10} \text{ of } 50).$$

$$57\frac{1}{2} = 50 + 5 \text{ or } (\frac{1}{10} \text{ of } 50) + 2\frac{1}{2} \text{ or } (\frac{1}{2} \text{ of } 5).$$

$$62\frac{1}{2} = 50 + 12\frac{1}{2} \text{ or } (\frac{1}{4} \text{ of } 50).$$

$$67\frac{1}{2} = 50 + 12\frac{1}{2} \text{ or } (\frac{1}{4} \text{ of } 50) + 5 \text{ or } (\frac{1}{10} \text{ of } 50).$$

EXERCISE 25.

Multiply

- (1) 8 by 10; 25; $12\frac{1}{2}$; 35; $37\frac{1}{2}$.
- (2) 12 by 15; $17\frac{1}{2}$; 20; 25; 35.
- (3) 18 by $12\frac{1}{2}$; 20; 25; $37\frac{1}{2}$; 45.
- (4) 24 by $12\frac{1}{2}$; $18\frac{3}{4}$; 50; $52\frac{1}{2}$; $62\frac{1}{2}$.
- (5) 36 by 50; 45; 55; $62\frac{1}{2}$; $67\frac{1}{2}$.
- (6) 44 by 20; 35; 45; 55; 65.
- (7) 52 by 25; $27\frac{1}{2}$; $32\frac{1}{2}$; $57\frac{1}{2}$; $62\frac{1}{2}$.
- (8) 64 by $17\frac{1}{2}$; $22\frac{1}{2}$; $27\frac{1}{2}$; 55; $57\frac{1}{2}$.
- (9) 72 by 25; $27\frac{1}{2}$; $22\frac{1}{2}$; 35; $37\frac{1}{2}$.
- (10) 96 by 10; 15; $17\frac{1}{2}$; $12\frac{1}{2}$; $18\frac{3}{4}$.
- (11) 84 by 20; $12\frac{1}{2}$; $32\frac{1}{2}$; $18\frac{3}{4}$; 22.
- (12) 176 by 50; 45; 55; $52\frac{1}{2}$; $47\frac{1}{2}$.
- (13) 786 by 50; 55; $57\frac{1}{2}$; $62\frac{1}{2}$; $67\frac{1}{2}$.
- (14) 936 by 10; $12\frac{1}{2}$; 15; $17\frac{1}{2}$; $18\frac{3}{4}$.
- (15) 3156 by 25; $37\frac{1}{2}$; $22\frac{1}{2}$; $27\frac{1}{2}$; 35.
- (16) 5174 by 50; $47\frac{1}{2}$; 55; $57\frac{1}{2}$; $67\frac{1}{2}$.
- (17) 7192 by $62\frac{1}{2}$; 45; $52\frac{1}{2}$; $67\frac{1}{2}$; $47\frac{1}{2}$.
- (18) 9228 by $17\frac{1}{2}$; $27\frac{1}{2}$; $37\frac{1}{2}$; $57\frac{1}{2}$; $67\frac{1}{2}$.

DECIMAL FRACTIONS.

Decimal is derived from the Latin "decem," ten. A Decimal Fraction is one having ten or a power of ten as a denominator as $\frac{7}{10}$, $\frac{13}{100}$, $\frac{1079}{10000}$. Instead of writing the denominators, however, as above, they are indicated by means of a period or "decimal point" placed before or between the figures of the numerator as many digits to the left as there are ciphers in the denominator.

Thus: $\frac{7}{10} = .7$; $\frac{13}{100} = .13$; $\frac{1079}{10000} = .079$; $\frac{1}{100000} = .00003$.

EXERCISE 26.

Write in decimal form.

- (1) $\frac{3}{10}$; $\frac{7}{100}$; $\frac{13}{100}$; $\frac{1079}{10000}$; $\frac{39}{10000}$.
 (2) $3\frac{9}{10}$; $17\frac{7}{10}$; $9\frac{37}{100}$; $137\frac{123}{1000}$; $19\frac{2649}{10000}$.
 (3) $29\frac{7}{100}$; $16\frac{9}{1000}$; $24\frac{17}{1000}$; $156\frac{273}{10000}$; $162\frac{3}{100000}$.

To reduce a common fraction to a decimal.

Example: Reduce $\frac{3}{4}$ to a decimal. $\frac{3}{4} = \frac{3.000}{4.000}$.

It matters not how many ciphers are affixed to a decimal its value is not altered. Thus 3. may be written 3.0, 3.00, 3.000, or 3.0000.

In the above example as many ciphers may be added after the decimal point to numerator 3 as are necessary to obtain an even quotient when dividing, in this case three ciphers are added and the result .375 obtained.

Sometimes, however, and in fact always when the denominator of the common fraction contains other prime factors than 2 and 5, instead of obtaining an even quotient the same figure or group of figures will repeat over and over again as long as we continue the division. This feature of such decimals is indicated by placing a period over the digit, if one, or the first and last digits of the group that repeats. Thus

$$\frac{1}{3} = .\dot{3}; \frac{17}{18} = .9\dot{4}; \frac{15}{28} = .5357142\dot{7}.$$

EXERCISE 27.

Reduce to decimals

- (1) $\frac{1}{2}, \frac{1}{4}, \frac{1}{5}, \frac{1}{8}, \frac{1}{16}, \frac{3}{4}, \frac{3}{8}, \frac{5}{8}, \frac{7}{8}, \frac{13}{16}$
 (2) $\frac{1}{3}, \frac{1}{6}, \frac{1}{7}, \frac{1}{9}, \frac{1}{11}, \frac{2}{3}, \frac{5}{6}, \frac{6}{7}, \frac{8}{9}, \frac{10}{11}$
 (3) $\frac{9}{14}, \frac{13}{18}, \frac{17}{28}, \frac{14}{27}, \frac{19}{28}, \frac{23}{25}, \frac{29}{35}, \frac{27}{42}, \frac{37}{45}, \frac{54}{54}$

ADDITION OF DECIMALS.

Decimals may be added, subtracted, multiplied or divided as integers except for the placing of the decimal point in the result.

Arrange the numbers to be added so that their decimal points will be in the same vertical line. Add as with integers and place the decimal point of the total directly under those of the numbers added.

EXERCISE 28.

- (1) Add .37; .759; .9; .6487; .32; .7359; .972.
 (2) Add .7; .3795; .62; .375; .79285; .6847; .79; .6835.
 (3) Add 3.92867; 19.37; 14.9275; 9.756; 136.3928; 8.67548;
 12.749.
 (4) Add 73.395861; 9.759; 864.7; 93.268; 7.945; 9276.3;
 94.37568.
 (5) Add 394.7; 7.2968; 394; 1.75; 63.74; 943.682; 79.568;
 .92678.

SUBTRACTION OF DECIMALS.

To subtract decimal fractions arrange the numbers as in addition, so that the decimal points of the two numbers will be one directly over the other. If the lower number contains more decimal places than the upper, add sufficient ciphers to the upper number to overcome the deficiency then proceed as with integers. Again place the decimal point in the answer directly underneath those of the numbers subtracted.

Example: From 91.372 subtract 7.39468.

$$\begin{array}{r}
 \text{Arrange numbers thus:} \quad \dots\dots\dots 91.37200 \\
 \phantom{\text{Arrange numbers thus:} \quad \dots\dots\dots} 7.39468 \\
 \hline
 \text{Difference} \dots\dots\dots 83.97732 \text{ Ans.}
 \end{array}$$

EXERCISE 29

Find the difference between:

- | | |
|-------------------------|--------------------------|
| (1) 7.3946 and 3.4961. | (6) 73.29684 and 97.3. |
| (2) 9.4732 and 1.32695. | (7) 3.694725 and 1.6379. |
| (3) 19.34 and .46937. | (8) 9.276843 and 12.74. |
| (4) 27.2 and 29.3257. | (9) 2469.3 and 7.3925. |
| (5) 21.928 and 1.97. | (10) 23.976 and 5.92867. |

MULTIPLICATION OF DECIMALS.

In multiplication of decimals it matters not how the numbers to be multiplied are arranged as to their decimal points. Place them one underneath the other and multiply as with integers. To fix the decimal point count the total number of figures to the right of the points in both multiplier and multiplicand and mark off this total number, beginning with the right hand figure of the product and counting to the left, where necessary adding "naughts" to get the required number.

Example: Multiply 72.9325 by 1.73.

Arrange	72.9325	4 decimal places.
	1.73	2 " "

	2187975	
	5105275	
	729325	

	126.173225	6 " "

EXERCISE 30.

Find the product of

- | | |
|------------------------------|-------------------------------|
| (1) 37.294×1.379 . | (6) $.274693 \times .659$. |
| (2) $74.3256 \times .728$. | (7) $7294752 \times .738$. |
| (3) 9.372479×72.4 . | (8) 6497.325×6347 . |
| (4) 394.378×9.735 . | (9) 39.268×7.5786 . |
| (5) $9.426 \times .3749$. | (10) $.32746 \times .00378$. |

MULTIPLICATION OF DECIMALS.

CONTRACTED METHOD.

Required the product of 37.294685 by 1.3725 correct to three decimal places.

ORDINARY METHOD

37.294685
1.3725

18 6473425
74 589370
2610 62795
11188 4055
37294 685

51.186 9551625

CONTRACTED METHOD

37.294685
52731

372947
111884
26106
746
186

51.1869

To insure correct results by the contracted method care must be used in placing the multiplier in proper position and in setting the figures one by one directly underneath those of the multiplicand.

Place the "units" figure of the multiplier one place farther to the right of the decimal point in the multiplicand than is required correct in the product. For example: if two places in the product are required correct, place the units figure of the multiplier under the third place; if six decimal places are required correct, the units figure is placed under the seventh and so on. In the above example three places correct are called for so that the units figure of the multiplier "1" is placed under the fourth decimal place, "6," and the order of the others figures of the multiplier reversed, (see example).

In starting the multiplication, multiply the first figure of

the multiplicand, to the right of that of the multiplier you are multiplying by, to get the carrying figure, multiply the one directly above, (add the figures carried), and set down the result then multiply all others to the left in the usual way. Continue the multiplication by the remaining figures of the multiplier setting the products underneath one another so that the right hand figures will form a vertical row. (See example). Add and mark off the number of places to which multiplication was made.

EXERCISE 31.

Multiply

- | | | |
|------|--------------------------|--------------------------------|
| (1) | 7.2946×1.375 | correct to two decimal places. |
| (2) | 1.94763×2.47 | " four " " |
| (3) | $739.8675 \times .3819$ | " three " " |
| (4) | $.729468 \times 72.9$ | " three " " |
| (5) | $1.9247358 \times .694$ | " five " " |
| (6) | $375.628 \times .738$ | " two " " |
| (7) | 2.739587×71.396 | " four " " |
| (8) | $3.976489 \times .3598$ | " six " " |
| (9) | 72.69435×7641 | " two " " |
| (10) | 1.394876×3.2579 | " six " " |

DIVISION OF DECIMALS.

Multiply the divisor and dividend by 10 or such power of 10 as will make the divisor a whole number. In the example here shown both are multiplied by 100. Mark off by a vertical stroke in the dividend to the right of the decimal point as many places as are required correct in the answer where necessary add ciphers to get the required number. (See example). Divide as with whole numbers until this vertical line is reached; mark off in the quotient the required number of decimal places again

inserting ciphers when necessary and the desired result is obtained. Another method used in locating the decimal point in the quotient is to watch that point in the dividend and before bringing down the first figure following it, place the decimal point in the quotient.

Example: Divide 7.2395462 by 3.76 correct to three places of decimals.

$$\begin{array}{r}
 376 \overline{) 723.95462} \quad (1.925 \\
 \underline{376} \\
 3479 \\
 \underline{3384} \\
 955 \\
 \underline{752} \\
 2034 \\
 \underline{1880} \\
 154
 \end{array}$$

EXERCISE 32.

Divide

- | | | | |
|------|--------------|---------|--------------------------------|
| (1) | 72.9435 by | 134.7, | correct to two decimal places. |
| (2) | 3.94762 by | 74.19, | " four " " |
| (3) | 173.295 by | .472, | " three " " |
| (4) | 7.289675 by | 3.719, | " five " " |
| (5) | 31.926957 by | 7246, | " three " " |
| (6) | 924.6795 by | .9168, | " one " " |
| (7) | 39.76403 by | 8.35, | " two " " |
| (8) | 172.43 by | .367, | " three " " |
| (9) | 743 by | .0069, | " six " " |
| (10) | .00932864 by | .00047, | " five " " |

DIVISION OF DECIMALS. CONTRACTED METHOD.

In the division of decimals it is rarely necessary to obtain results correct to more than two or three places of decimals, consequently there is not the same opportunity of shortening the work as in the multiplication of decimals. This opportunity is also practically cut off where the divisor is a short one containing but two or three figures. A comparison of the solutions shown below will, however, demonstrate the advantages gained where the divisor is a fairly long one.

EXAMPLE:—Divide 38.67 by 7.346738, correct to three places.

ORDINARY METHOD	CONTRACTED METHOD
7346738) 386700 00 (5.263	7346738) 386700 (5.263
36733690	367337
19363100	19363
14693476	14693
46696240	4670
44080428	4408
26158120	262
22040214	220
4117906	42

Contracted method solution.

By comparison of the whole numbers "7" of the divisor and "38" of the dividend, we find we will have one figure as the whole number in the quotient and as we want three decimal places correct, our answer will contain four digits. This being

the case, cut off by a vertical line all but five figures (counting from the left) of the divisor. Affix the ciphers required to the dividend, in this case two are needed, and begin the division. 73467 will divide into 386700, five times, hence the first figure of the quotient will be 5. In multiplying, in order to get the right carrying figure from the numbers dropped from the divisor multiply the 3 by 5 which produces 15. When the units figure of the product thus obtained is five or over, carry one more than the tens figure given, in this case we carry 2. Continue the multiplication setting down the product 367337 as shown; then subtract. In each subsequent division instead of bringing down another number from the dividend or affixing a cipher to the last remainder we cut off the next right hand figure of the divisor, the last remainder becomes the new dividend and the divisor thus reduced the new divisor. Continue the division until the number of figures required in the quotient is obtained. In multiplying, each time, to get the carrying figure multiply the figure to the right of the divisor actually being used.

EXERCISE 32 (a).

Divide, using the contracted method:

- | | | | |
|------|-------------|-----------|--------------------------------------|
| (1) | 3.2674 by | 1.6927, | correct to three places of decimals. |
| (2) | 72.3948 by | 32.7456, | " four " " |
| (3) | 9.6872 by | .5684, | " two " " |
| (4) | 1792.18 by | 372.65, | " three " " |
| (5) | .72548 by | .59684, | " five " " |
| (6) | 37.29684 by | 1.726745, | " six " " |
| (7) | .93847 by | .8257, | " three " " |
| (8) | 3926.7 by | 3.6258, | " two " " |
| (9) | 73938 by | 87.9462, | " four " " |
| (10) | 125.783 by | .7392467, | " seven " " |

PERCENTAGE. No 1

The term "per cent." is an abbreviation of a latin phrase, "per centum," which means "per hundred," or "out of the hundred;" and "rate per cent." means "rate on the hundred," thus "six per cent." means "six on the hundred;" "eight per cent." means "eight on the hundred." and so on.

There are several ways of indicating the "rate per cent." Thus: six per cent. may be written 6 per cent.; 6% ; $\frac{6}{100}$; or .06; or three and one half per cent. may be written $3\frac{1}{2}$ per cent; $3\frac{1}{2}\%$; $\frac{3\frac{1}{2}}{100}$; or .03 $\frac{1}{2}$.

There are also two ways of finding the percentage of a number, namely the common fractional form as $\frac{6}{100}$ of 375, $\frac{3\frac{1}{2}}{100}$ of 640, and the decimal form $375 \times .06$, and $640 \times .035$. While the former is much used, the latter or decimal form is to be preferred.

EXERCISE 33.

Using the decimal form find the percentages as indicated below.

- (1) \$4.00— 3% ; 5% ; 6% ; 9% ; 12% .
- (2) \$9.00— 5% ; 7% ; 8% ; 11% ; 15% .
- (3) \$72.00— 6% ; 9% ; 13% ; 17% ; 22% .
- (4) \$56.00— 8% ; 12% ; 16% ; 24% ; 30% .
- (5) \$29.00— 7% ; 11% ; 15% ; 19% ; 23% .
- (6) \$524.00— 9% ; 16% ; 24% ; 36% ; 45% .
- (7) \$974.00— 14% ; 20% ; 27% ; 30% ; 36% .
- (8) \$1276.00— 12% ; 24% ; 36% ; 40% ; 48% .
- (9) \$1340.00— 16% ; 27% ; 42% ; 65% ; 84% .
- (10) \$1726.00— 18% ; 32% ; 45% ; 62% ; 75% .

- (11) \$4.60—5% ; 3% ; 8% ; 9% ; 3½%.
- (12) \$8.20—6% ; 7% ; 8% ; 5% ; 16½%.
- (13) \$35.60—3% ; 4% ; 16% ; 18% ; 29½%.
- (14) \$47.50—4% ; 15% ; 27% ; 39% ; 47½%.
- (15) \$38.60—13% ; 16% ; 18% ; 12% ; 24½%.
- (16) \$92.80—12% ; 15% ; 20% ; 24% ; 22½%.
- (17) \$840.50—20% ; 26% ; 27% ; 42% ; 47½%.
- (18) \$960.75—16% ; 18% ; 22% ; 24% ; 27½%.

SHORT METHODS OF GETTING PERCENTAGES.

To find 10% of a number.

Move the decimal point one place to the left. Thus: 10% of \$372.65 is \$37.265.

Using 10% as the base.

$$5\% = \frac{1}{2} \text{ of } 10.$$

$$- 3\frac{1}{3}\% = \frac{1}{3} \text{ of } 10.$$

$$2\frac{1}{2}\% = \frac{1}{4} \text{ of } 10.$$

$$- 1\frac{2}{3}\% = \frac{1}{6} \text{ of } 10.$$

$$- 1\frac{1}{4}\% = \frac{1}{8} \text{ of } 10.$$

$$7\frac{1}{2}\% = 10\% - 2\frac{1}{2}\% (\frac{1}{4} \text{ of } 10).$$

$$15\% = 10\% + 5\% (\frac{1}{2} \text{ of } 10).$$

$$17\frac{1}{2}\% = 10\% + 5\% (\frac{1}{2} \text{ of } 10) + 2\frac{1}{2}\% (\frac{1}{2} \text{ of } 5\%).$$

$$30\% = 3 \text{ times } 10\%.$$

$$- 40\% = 4 \text{ times } 10\%.$$

$$- 42\frac{1}{2}\% = 40\% (4 \text{ times } 10\%) + 2\frac{1}{2}\% (\frac{1}{4} \text{ of } 10\%).$$

$$- 60\% = 6 \text{ times } 10\%.$$

$$- 70\% = 7 \text{ times } 10\%.$$

$$- 80\% = 8 \text{ times } 10\%.$$

$$90\% = 9 \text{ times } 10\%, \text{ or } 100\% - 10\%.$$

EXERCISE 34.

Find the percentages indicated.

- ✓ (1) Of \$2.00 find 10% ; 5% ; 11% ; $7\frac{1}{2}\%$; $17\frac{1}{2}\%$.
- ✓ (2) Of \$2.70 find 10% ; $3\frac{1}{4}\%$; $1\frac{3}{5}\%$; 15% ; $17\frac{1}{2}\%$.
- ✓ (3) Of \$27.64 find 10% ; $2\frac{1}{2}\%$; $1\frac{1}{4}\%$; $7\frac{1}{2}\%$; 15% .
- (4) Of \$74.59 find 10% ; 5% ; $2\frac{1}{2}\%$; $7\frac{1}{2}\%$; $17\frac{1}{2}\%$.
- (5) Of \$725.82 find 10% ; $1\frac{1}{4}\%$; 5% ; $7\frac{1}{2}\%$; 15% .
- (6) Of \$42.93 find 10% ; 30% ; 60% ; 70% ; 80% .
- (7) Of \$294.60 find 10% ; 40% ; $42\frac{1}{2}\%$; 70% ; $72\frac{1}{2}\%$.
- (8) Of \$764.91 find 10% ; $42\frac{1}{2}\%$; 60% ; 80% ; 90% .

To find 25% of a number.

Divide by 4. Thus 25% of \$724.60 = $\$724.60 \div 4$, or \$181.15.
Using 25% as the base.

$$27\frac{1}{2}\% = 25\% + 2\frac{1}{2}\% \left(\frac{1}{10} \text{ of } 25\%\right).$$

$$22\frac{1}{2}\% = 25\% - 2\frac{1}{2}\% \left(\frac{1}{10} \text{ of } 25\%\right).$$

$$31\frac{1}{4}\% = 25\% + 6\frac{1}{4}\% \left(\frac{1}{4} \text{ of } 25\%\right).$$

$$35\% = 25\% + 10\%.$$

$$37\frac{1}{2}\% = 25\% + 12\frac{1}{2}\% \left(\frac{1}{2} \text{ of } 25\%\right).$$

EXERCISE 35.

Find 25% ; $27\frac{1}{2}\%$; $22\frac{1}{2}\%$; $31\frac{1}{4}\%$; 35% and $37\frac{1}{2}\%$ of each of the following amounts:—

- (1) \$6.00; (2) \$8.00; (3) \$14.00; (4) \$18.00; (5) \$26.00;
- (6) \$36.00; (7) \$49.00; (8) \$49.60; (9) \$57.40; (10) \$126.00;
- (11) \$178.00; (12) \$169.32; (13) \$174.68; (14) \$192.75;
- (15) \$236.00; (16) \$292.80; (17) \$312.00; (18) \$368.20;
- (19) \$432.00; (20) \$472.80; (21) \$1368.00.

To find 50% of a number.

Divide by 2. Thus 50% of \$176.40 is $\$176.40 \div 2$, or \$88.20.
Using 50% as a base:

$$\begin{aligned} 45\% &= 50\% - 5\% \left(\frac{1}{10} \text{ of } 50\%\right). \\ 55\% &= 50\% + 5\% \left(\frac{1}{10} \text{ of } 50\%\right). \\ 47\frac{1}{2}\% &= 50\% - 2\frac{1}{2}\% \left(\frac{1}{2} \text{ of } 50\%\right). \\ 52\frac{1}{2}\% &= 50\% + 2\frac{1}{2}\% \left(\frac{1}{2} \text{ of } 50\%\right). \\ 57\frac{1}{2}\% &= 50\% + 5\% \left(\frac{1}{10} \text{ of } 50\%\right) + 2\frac{1}{2}\% \left(\frac{1}{2} \text{ of } 5\%\right). \\ 62\frac{1}{2}\% &= 50\% + 12\frac{1}{2}\% \left(\frac{1}{4} \text{ of } 50\%\right). \\ 67\frac{1}{2}\% &= 50\% + 12\frac{1}{2}\% \left(\frac{1}{4} \text{ of } 50\%\right) + 5\% \left(\frac{1}{10} \text{ of } 50\%\right). \\ 65\% &= 50\% + 10\% + 5\% \left(\frac{1}{2} \text{ of } 10\%\right). \end{aligned}$$

EXERCISE 36.

- (1) Of \$16.00 find 50%; 55%; 57½%; 62½%; 67½%.
- (2) Of \$32.40 find 50%; 45%; 55%; 57½%; 65%.
- (3) Of \$68.75 find 50%; 57½%; 62½%; 67½%; 65%.
- (4) Of \$196.00 find 50%; 47½%; 52½%; 62½%; 67½%.
- (5) Of \$368.20 find 50%; 45%; 57½%; 65%; 67½%.

100% of a number is the number itself.

Using 100% as the base:

$$\begin{aligned} 50\% &= \frac{1}{2} \text{ of } 100\%. \\ 33\frac{1}{3}\% &= \frac{1}{3} \text{ of } 100\%. \\ 25\% &= \frac{1}{4} \text{ of } 100\%. \\ 20\% &= \frac{1}{5} \text{ of } 100\%. \\ 16\frac{2}{3}\% &= \frac{1}{6} \text{ of } 100\%. \\ 14\frac{2}{7}\% &= \frac{1}{7} \text{ of } 100\%. \\ 12\frac{1}{2}\% &= \frac{1}{8} \text{ of } 100\%. \\ 11\frac{1}{9}\% &= \frac{1}{9} \text{ of } 100\%. \end{aligned}$$

$$18\frac{3}{4}\% = 12\frac{1}{2}\% (\frac{1}{4} \text{ of } 100\%) + 6\frac{1}{4}\% (\frac{1}{2} \text{ of } 12\frac{1}{2}\%).$$

$$75\% = 100\% - 25\% (\frac{1}{4} \text{ of } 100\%).$$

$$83\frac{1}{3}\% = 100\% - 16\frac{2}{3}\% (\frac{1}{6} \text{ of } 100\%).$$

$$87\frac{1}{2}\% = 100\% - 12\frac{1}{2}\% (\frac{1}{4} \text{ of } 100\%).$$

$$88\frac{8}{9}\% = 100\% - 11\frac{1}{9}\% (\frac{1}{9} \text{ of } 100\%).$$

$$90\% = 100\% - 10\% (\frac{1}{10} \text{ of } 100\%).$$

$$95\% = 100\% - 5\% (\frac{1}{20} \text{ of } 100\%).$$

$$97\frac{1}{2}\% = 100\% - 2\frac{1}{2}\% (\frac{1}{4} \text{ of } 10\%).$$

$$112\frac{1}{2}\% = 100\% + 12\frac{1}{2}\% (\frac{1}{4} \text{ of } 100\%).$$

$$125\% = 100\% + 25\% (\frac{1}{4} \text{ of } 100\%).$$

EXERCISE 37.

- (1) Of \$72.00 find 50%; 75%; $83\frac{1}{3}\%$; 90%; $97\frac{1}{2}\%$.
- (2) Of \$94.60 find 25%; $33\frac{1}{3}\%$; 20%; $12\frac{1}{2}\%$; $112\frac{1}{2}\%$.
- (3) Of \$174.95 find $16\frac{2}{3}\%$; 75%; $87\frac{1}{2}\%$; $116\frac{2}{3}\%$; 125%.
- (4) Of \$212.50 find $12\frac{1}{2}\%$; $87\frac{1}{2}\%$; 25%; 75%; $97\frac{1}{2}\%$.
- (5) Of \$937.68 find 20%; $33\frac{1}{3}\%$; $83\frac{1}{3}\%$; 120%; 125%.
- (6) Of \$1729.40 find $12\frac{1}{2}\%$; $18\frac{3}{4}\%$; $87\frac{1}{2}\%$; $88\frac{8}{9}\%$; 110%.

EXERCISE 38.

Use the short method in finding each of the following percentages:

- (1) Of \$8.00 find 2%; 3%; 5%; 6%; 7%.
- (2) Of \$18.00 find 4%; 6%; 7%; 8%; 9%.
- (3) Of \$24.00 find $2\frac{1}{2}\%$; 3%; 5%; 6%; $7\frac{1}{2}\%$.
- (4) Of \$47.60 find 5%; $12\frac{1}{2}\%$; 15%; 22%; 25%.
- (5) Of \$59.80 find 10%; $17\frac{1}{2}\%$; $22\frac{1}{2}\%$; 35%; 45%.
- (6) Of \$72.96 find 20%; $32\frac{1}{2}\%$; 35%; $42\frac{1}{2}\%$; 55%.
- (7) Of \$127.00 find 25%; $47\frac{1}{2}\%$; 55%; $62\frac{1}{2}\%$; 70%.
- (8) Of \$326.85 find 40%; $57\frac{1}{2}\%$; 75%; 80%; 90%.

TRADE DISCOUNT.

In some mercantile and manufacturing businesses several discounts in a series must be deducted from a list price before the net cost of the goods is obtained.

Example: Saws may be listed at \$48.00 per dozen, subject to discounts of 60%, 37½% and 20%

Solution (A).

List price.....	\$48.00
First discount, 60%; 10% or $\$4.80 \times 6$	28.80
Balance	\$19.20
Second discount, 37½% { 25% or $\frac{1}{4}$ of \$19.20 = \$4.80	
{ 12½% or $\frac{1}{2}$ of 25% = 2.40	
	7.20
Balance.....	12.00
Third discount, 20%, or $\frac{1}{5}$	2.40
Balance or net amount.....	\$9.60

Solution (B).

List price	\$48.00
First discount, 60%; 60% off leaves 40% ($\$4.80 \times 4$).....	19.20
Second discount, 37½%; { 50% of \$19.20 = \$9.60	
{ 37½% off leaves 62½% { 12½% of 19.20 = 2.40	
	12.00
Third discount, 20%; 20% off leaves 80% ($\$1.20 \times 8$)...	\$9.60
Net amount is \$9.60.	

Solution (C).

List price is\$48.00

60% off 100% leaves 40%.

37½% off 100% leaves 62½%.

20% off 100% leaves 80%.

62½% of 40% = 25%; 80% of 25% = 20%;

20% of \$48.00 = 9.60

Net amount, \$9.60.

EXERCISE 39.

In working the following examples find discounts by the short methods shown on page 45 and use either Solution A, B or C, or a combination of them.

Find the net amount of

- | | | |
|------|-----------|--------------------------|
| (1) | \$32.00 | discounts 50%, 25%, 10%. |
| (2) | \$56.00 | " 40%, 20%, 5%. |
| (3) | \$64.00 | " 25%, 15%, 2½%. |
| (4) | \$48.00 | " 60%, 30%, 15%. |
| (5) | \$26.00 | " 35%, 20%, 5%. |
| (6) | \$375.00 | " 20%, 10%, 5%. |
| (7) | \$455.00 | " 15%, 5%, 2½%. |
| (8) | \$568.00 | " 37½%, 12½%, 10%. |
| (9) | \$764.00 | " 55%, 37½%, 12½%. |
| (10) | \$1268.00 | " 62½%, 50%, 15%. |
| (11) | \$1350.00 | " 87½%, 62½%, 10%. |
| (12) | \$724.00 | " 27½%, 17½%, 2½%. |
| (13) | \$48.00 | " 35%, 22½%, 7½%. |
| (14) | \$127.00 | " 22½%, 10%, 5%. |
| (15) | \$714.00 | " 32½%, 20%, 10%. |

4
10.80
25.54
39.78

(16)	\$97.40 less	10%, 5%, 2½%.
(17)	\$75.60	" 5%, 2½%, 1%.
(18)	\$179.24	" 15%, 10%, 5%.
(19)	\$235.78	" 17½%, 10%, 7½%.
(20)	\$327.65	" 20%, 15%, 7½%.
(21)	\$369.72	" 22½%, 17½%, 2%.
(22)	\$1724.63	" 27½%, 25%, 22½%.
(23)	\$1760.37	" 35%, 33½%, 20%.
(24)	\$1926.87	" 37½%, 22½%, 12½%.
(25)	\$2165.20	" 45%, 35%, 15%.
(26)	\$2576.84	" 55%, 50%, 37½%.
(27)	\$3267.53	" 62½%, 55%, 45%.
(28)	\$3655.78	" 65%, 60%, 40%.
(29)	\$4170.24	" 75%, 62½%, 52½%.
(30)	\$4568.25	" 87½%, 83½%, 75%.

INTEREST AND DISCOUNT.

Interest is the use of money after it is due. Discount is the use of money before it is due.

Interest is usually reckoned at a rate per cent. per annum of the principal sum, so that when the time mentioned is one year the amount of interest is found by multiplying the principal by the rate per cent. expressed either in its common fractional or decimal form.

Example: The interest on \$75.00 at 6% for one year, using the fractional form is $\frac{6}{100}$ of \$75.00, or \$4.50 and using the decimal form might be indicated thus $\$75 \times .06 = \4.50 .

Again let me impress upon you the fact that the latter or

decimal form is the better and students who adopt it altogether are generally found to get results more quickly and surely.

When the time for which interest is required to be found is more or less than a year, find first the year's interest and multiply that amount by the number of years or fraction of a year as the case may be.

Example 1: Find the interest on \$376.00 for 69 days at 8%. The year's interest is $\$376.00 \times .08$, or \$30.08. 69 days is $\frac{69}{365}$ of a year and 69 days' interest will be $\frac{69}{365}$ of \$30.08, or \$5.69.

Example 2: Find the interest on \$256.00 for 3 years, 95 days, at 6%. The year's interest is $\$256.00 \times .06$, or \$15.36.

3 years' interest is $\$15.36 \times 3 = \46.08

95 days' interest is $\frac{95}{365}$ of \$15.36 = 4.00

And 3 years, 95 days' interest is \$50.08 Ans.

Seldom, in finding the interest for the fraction of a year, would we recommend attempting to cancel before multiplying, except the number of days is 73, 146, 219, or 292, which are $\frac{1}{5}$, $\frac{2}{5}$, $\frac{3}{5}$ and $\frac{4}{5}$ of a year, respectively, as more time is wasted than gained by so doing. Neither would we recommend reducing the year or years to days, when the time is over a year.

EXERCISE 40.

Find the interest to the nearest cent on

- (1) \$72.00 for 3 years at 6%.
- (2) \$98.00 " 2 " 5%.
- (3) \$24.75 " 4 " 4%.
- (4) \$165.72 " 5 " 7%.
- (5) \$278.95 " 4 " 3%.

(6)	\$324.00	for 2 years	at $5\frac{1}{2}\%$.
(7)	\$427.00	" 3 "	$4\frac{1}{2}\%$.
(8)	\$612.50	" 4 "	$3\frac{1}{2}\%$.
(9)	\$540.75	" 5 "	$6\frac{1}{2}\%$.
(10)	\$376.84	" 3 "	$7\frac{1}{2}\%$.
(11)	\$136.00	for 37 days	at 5% .
(12)	\$274.00	" 72 "	$5\frac{1}{2}\%$.
(13)	\$412.50	" 85 "	6% .
(14)	\$324.75	" 93 "	$4\frac{1}{2}\%$.
(15)	\$768.77	" 97 "	$6\frac{1}{2}\%$.
(16)	\$465.73	" 123 "	4% .
(17)	\$783.25	" 178 "	$4\frac{1}{2}\%$.
(18)	\$1346.78	" 236 "	5% .
(19)	\$1876.32	" 278 "	$5\frac{1}{2}\%$.
(20)	\$2632.79	" 312 "	7% .
(21)	\$850.00	for 1 year 37 days	at 6% .
(22)	\$927.36	" 3 " 164 "	5% .
(23)	\$1032.65	" 2 " 379 "	$4\frac{1}{2}\%$.
(24)	\$1149.68	" 4 " 298 "	4% .
(25)	\$1795.86	" 5 " 359 "	$7\frac{1}{2}\%$.
(26)	\$2398.74	" 6 " 70 "	$5\frac{1}{2}\%$.
(27)	\$2794.56	" 7 " 148 "	6% .
(28)	\$3268.32	" 7 " 219 "	$6\frac{1}{2}\%$.
(29)	\$3574.98	" 8 " 236 "	5% .
(30)	\$7280.48	" 9 " 350 "	7% .

Perhaps as often as not, when interest is required instead of the time being expressed in years, days, or in both, the dates between which the interest is to be found are given, as for example:

Find the interest on \$75 at 5% , from June 12, 1905, to September 4, 1907.

Reckon the full years first, thus from June 12, 1905, to June 12, 1907, is two years, now reckon the days from June 12, to September 4, 84 days, the time is therefore 2 years 84 days. From this point proceed as before explained.

EXERCISE 41.

- (1) Find the interest on \$60.00 at $4\frac{1}{2}\%$, from April 4, 1907, to October 16, 1907.
- (2) Find the interest on \$125.00 at $5\frac{1}{2}\%$, from June 17, 1906, to December 10, 1907.
- (3) Find the interest on \$176.40 at 6% , from October 14, 1904, to November 12, 1906.
- (4) Find the interest on \$252.75 at 5% , from December 13, 1903, to March 16, 1907.
- (5) Find the interest on \$326.90 at 4% , from August 12, 1902, to June 10, 1905.
- (6) Find the interest on \$376.85 at $5\frac{1}{2}\%$, from February 12, 1904, to May 17, 1907.
- (7) Find the interest on \$428.60 at 6% , from May 17, 1903, to February 19, 1906.
- (8) Find the interest on \$537.48 at $4\frac{1}{2}\%$, from January 11, 1902, to December 31, 1907.
- (9) Find the interest on \$748.62 at 5% , from March 12, 1906, to February 28, 1907.
- (10) Find the interest on \$927.78 at $6\frac{1}{2}\%$, from July 19, 1900, to March 13, 1907.

Often a problem in interest comes through one requiring to find the interest due or accrued on a note. It is here the question as to whether one should add "Days of Grace," arises, and often needlessly bothers some students. Possibly the following explanation, if studied out, will make the matter clear and save further trouble.

(a) Where the time for which interest is required is specified as "Find the interest for 90 days at 6% on a note of \$125," "Days of Grace" should not be added as that would alter the question materially and the interest for 93 days would be given instead of that for 90 days as required.

(b) Where the time is specified as "Find the interest on a note of \$90, from May 21, to July 15," "Days of Grace" should not be added, as here the time is again definitely stated, "from May 21, to July 15," or 55 days, and not to July 18, or 58 days.

(c) Where the question reads: "Find the interest on a 90-day note for \$125 at 6%," then "Days of Grace" would be added because the note does not legally mature for ninety-three days from the date thereof, and interest is reckoned for the full time.

(d) Sometimes a note worded similar to the following is placed before one and the interest required.

Toronto, June 5, 1907.

On September 1, 1907, I promise to pay to
H. E. Kingdom, or order, Seventy-five $\frac{\times}{100}$ Dollars,
with interest at 5 per cent. per annum.

T. F. Wilson.

In settling same on day of maturity or in discounting it previous to that date, "days of grace" would be added in reckoning the interest, as the note would not legally mature for three days after the time mentioned in the face thereof, September 1st, and the time for which interest should be reckoned would be from June 5th to September 4th, or 91 days.

EXERCISE 42.

Work the following questions and see if you can discriminate as to whether days of grace should be added.

(1) Find the interest on \$78.60 for 138 days at 6% per annum.

- (2) Find the interest on \$193.20 from May 15, 1906, to August 31, 1907, at $5\frac{1}{2}\%$.
- (3) Find as at the date of maturity, the interest on a note of \$176.50 drawn for 70 days bearing interest at $5\frac{1}{2}\%$ per annum.
- (4) A note dated May 15, 1906, drawn at 3 months after date, bears interest at 5% per annum. Find the amount of interest at date of maturity.
- (5) A note of \$265, dated February 14, 1906, drawn for sixty days from date and bearing interest at $4\frac{1}{2}\%$ per annum, is settled on April 3rd, by payment of principal and interest accrued. Find the amount of the payment.
- (6) Find the interest due at maturity on the following note.

Toronto, June 5, 1907.

Three months after date I promise to pay to
W. E. Trent, or order, Sixty-seven $\frac{4.5}{100}$ Dollars,
with interest at 5 per cent. per annum.

C. F. Johnson.

- (7) Find 67 days interest on a note of \$375.80 at $5\frac{1}{2}\%$ per annum.
- (8) St. Catharines, September 1, 1906.

Ninety days after date I promise to pay to
David Troup, or order, One Hundred, Thirty-six
 $\frac{4.5}{100}$ Dollars, with interest at 6% per annum.

Samuel C. Gayman.

Find the interest due at maturity.

- (9) What is the interest accrued on November 14, 1906, on a note of \$396.75, dated August 24, 1905, and bearing interest at $5\frac{1}{2}\%$ per annum.
- (10) A note dated September 12, 1903, for \$425.85, and bearing interest at $6\frac{1}{2}\%$ per annum was paid in full on April 3, 1907. Find the amount of the payment.

BANK DISCOUNT.

Bank Discount is the interest paid in advance on a note or draft for the number of days before it is due.

As Bank Discount is simply "interest" it is reckoned by the Simple Interest methods.

In discounting a note that is interest bearing (so mentioned in its face) interest is first calculated for the full time of the note including the three days of grace and the discount taken for the unexpired time on the amount (principal and interest), of the note at maturity.

Example: A note of \$186 drawn for 90 days on April 3, 1906, bearing interest at 6% was discounted June 7, 1906, at 7%.

Face of note	\$186.00
Interest from April 3, to maturity (93 days) at 6%	2.84
Amount of note on July 5, date of maturity	188.84
Term of discount June 7, to July 5, 28 days	
Interest on \$188.84 for 28 days at 7%	1.01
Net proceeds of note	187.83

EXERCISE 43.

Find the Bank Discount and the net proceeds of the following:

- (1) Note dated January 3, 1907, for 60 days, discounted February 14, 1907, at 6%.
- (2) Note dated April 16, 1907, for 3 months, discounted June 1, 1907, at 7%.

- (3) Note dated November 3, 1906, for 6 months, discounted February 4, 1907, at $6\frac{1}{2}\%$.
- (4) Note dated August 17, 1907, for 90 days, discounted September 12, 1907, at 7% .
- (5) Note dated September 19, 1906, for 9 months, discounted March 10, 1907, at $6\frac{1}{2}\%$.
- (6) Note dated October 3, 1906, for 30 days, with interest at 5% , discounted October 17, 1907, at 6% .
- (7) Note dated March 14, 1907, for 2 months, with interest at 6% , discounted April 5, 1907, at 7% .
- (8) Note dated February 5, 1907, for 6 months, with interest at $5\frac{1}{2}\%$, discounted May 16, 1907, at 7% .
- (9) Note dated May 16, 1907, for 90 days, with interest at $6\frac{1}{2}\%$, discounted July 15, 1907, at 7% .
- (10) Note dated June 30, 1907, for 60 days, with interest at 6% , discounted July 23, 1907, at $6\frac{1}{2}\%$.

PRESENT WORTH AND TRUE DISCOUNT.

The **PRESENT WORTH** of a bill or debt due some time hence is such an amount as placed at interest at the given rate will at the stated time amount to the amount of the debt.

TRUE DISCOUNT is the difference between the amount of the debt at maturity and its Present Worth.

BANK DISCOUNT is the interest on the debt itself. True Discount is the interest on the Present Worth of the debt.

Bank Discount therefore exceeds the True Discount by the interest on the True Discount.

To find the Present Worth of a debt.

Divide the face thereof by the amount of \$1.00 for the given time at the given rate.

To find the True Discount of a debt.

Multiply the debt by the interest on \$1.00 for the given time at the stated rate and divide the product by the amount of \$1.00 for the same time and rate, or if the Present Worth be found subtract it from the amount of the debt at maturity and the difference is the True Discount.

Example: What is the Present Worth of a debt of \$720 due in 2 years. Money being worth 6% Simple Interest.

Interest on \$1.00 for 2 years, at 6% = .12.

Amount of \$1.00 for 2 years, at 6% = \$1.12.

Present Worth of debt = $\$720.00 \div 1.12$, or \$642.86 Ans.

True Discount on Debt = $\$720.00 - 642.86 = \77.14 ; or $\frac{1}{1.12}$ of \$720.00 = \$77.14.

Proof: The interest on an investment of \$642.86, the Present Worth of the debt, for 2 years at 6% = \$77.14. Principal invested \$642.86 + Interest \$77.14 = \$720.00, the amount of the debt.

EXERCISE 43.

- (1) Find the Present Worth of \$695.00 due in 3 years, if money be worth 5%.
- (2) I have a debt of \$1750.00 due in 4 years. What amount paid to-day would cancel the debt if money be worth 6%?
- (3) What discount should be allowed off a bill of \$75.00 due in 6 months, money being worth 6%?
- (4) Principal and interest on a bond of \$100.00 maturing in 10 years amounts to \$150.00. What should I pay for same to-day in order to make 6% on my money?
- (5) I have three bills of goods outstanding as follows:
 - \$85 due in 90 days.
 - \$120 " 75 days.
 - \$135 " 60 days.

What sum paid to-day should cancel all three debts?

TO REDUCE £. s. d. TO DOLLARS AND CENTS.

Example: Reduce £376. 7s. 8³d. to \$ and c.

Reduce the shillings to the decimal of a pound; 7s. = $\pounds \frac{7}{20} = \pounds .35$. Reduce the pence to farthings, 8³d. = 35 farthings. In reducing the farthings to the decimal of a pound we find that for most practical purposes when the number of farthings are between 12 and 35 inclusive, it will be near enough to add 1, and over 35 add 2 to the number and call the result thousandths of a pound. In this case the number of farthings is 35, we therefore add 1 and call the result $\frac{36}{1000}$, or .036 of a pound. Now add £376; £.35 and £.036 and the result is £376.386.

If the commercial par value, or \$4.86 $\frac{2}{3}$ to the pound, is required, divide the \$4.86 $\frac{2}{3}$ thus, and multiply; \$4.00, 80c. or $\frac{1}{5}$ of \$4.00, and 6 $\frac{2}{3}$ c. or $\frac{1}{2}$ of 80c.

£376.386

4

5) \$1505.544 = product by \$4.00

12) 301.109 = " .80 or $\frac{1}{5}$ of \$4.00.

25.092 = " .06 $\frac{2}{3}$ or $\frac{1}{2}$ of 80.

\$1831.745 = " \$4.86 $\frac{2}{3}$ Ans.

When other quotations per £ are given, if no similar short cut presents itself multiply in the ordinary way.

Sometimes the quotation is given at a rate of the old par value, as:

Find the value of £394, 17s. 1 $\frac{1}{2}$ d. at 109 $\frac{3}{4}$.

The quotation 109 $\frac{3}{4}$ means that for £1 we pay 109 $\frac{3}{4}$ per cent. of the old par value of \$4 $\frac{1}{2}$.

£394, 17s. 1½d. = £394 + £.85 + £.006, or £394.856
 $394.856 \times 4\frac{1}{2}\%$, or $4\frac{1}{2}\%$ = \$1754.92 (old par value).

10% of 1754.92 = 175.491

1% = 4.391

9½% = 171.101

109¾% = \$1926.02 Ans.

EXERCISE 44.

- (1) Reduce £374. 12s. 3½d. to \$ and c., at commercial par.
- (2) Reduce £1248. 18s. 9d. to \$ and c., at commercial par.
- (3) Reduce £75. 3s. 11d. to \$ and c., at commercial par.
- (4) Reduce £9. 19s. 10¾d. to \$ and c., at commercial par.
- (5) Reduce £726. 11s. 8½d. to \$ and c., at commercial par.
- (6) Reduce £13. 16s. 4d. to \$ and c., at commercial par.
- (7) Reduce £136. 12s. 7¼d. to \$ and c., at commercial par.
- (8) Reduce £1124. 10s. 5½d. to \$ and c., at commercial par.
- (9) Reduce £936. 13s. 11¼d. to \$ and c., at commercial par.
- (10) Reduce £894. 8s. 3½d. to \$ and c., at commercial par.
- (11) Reduce £324. 11s. 7¾d. to \$ and c., at \$4.85.
- (12) Reduce £568. 3s. 11¼d. to \$ and c., at \$4.88½.
- (13) Reduce £434. 5s. 7¾d. to \$ and c., at \$4.87½.
- (14) Reduce £1233. 17s. 5½d. to \$ and c., at \$4.96.
- (15) Reduce £312. 13s. 7d. to \$ and c., at \$4.77⅔.
- (16) Reduce £27. 5s. 9d. to \$ and c., at 109¼.
- (17) Reduce £138. 17s. 7½d. to \$ and c., at 110.
- (18) Reduce £527. 1s. 3d. to \$ and c., at 109¾.
- (19) Reduce £357. 15s. 5½d. to \$ and c., at 108½.
- (20) Reduce £640. 18s. 10½d. to \$ and c., at 110½.

EXTENSION OF INVOICES.

The rapid and accurate extension of invoices depends upon one's ability to add and multiply readily and upon one's quickness in picking out short methods of which there are many easy of operation and with reasonable care sure of results. Let me strongly impress upon you the necessity of always obtaining accurate results. A business man will not long tolerate the sending out of inaccurate invoices that will undoubtedly be returned by the customer for correction, thus adding humiliation to the extra trouble.

The short methods of multiplication shown on the preceding pages are especially valuable and should be carefully studied until one makes them his own.

For example: A grocer who wishes to find the value of, say 268 lbs of tea at $27\frac{1}{2}$ cents per lb., may reason thus: —

Break up the price $27\frac{1}{2}$ cents into two parts, 25c. and $2\frac{1}{2}$ c. 268 lbs. at \$1.00 = \$268., and at 25c., or $\frac{1}{4}$ of a \$1. = $\frac{1}{4}$ of \$268. or \$67. 268 lbs. at $2\frac{1}{2}$ c. ($\frac{1}{10}$ of 25c.) = $\frac{1}{10}$ of \$67, or \$6.70.

Add results \$67. and \$6.70 together and \$73.70, the result required, is obtained.

In short $27\frac{1}{2}\text{c.} = 25\text{c.} + 2\frac{1}{2}\text{c.}$

268 yds. at 25c. = $\frac{1}{4}$ of \$268, or	\$67.00
268 yds. at $2\frac{1}{2}\text{c.} = \frac{1}{10}$ of \$67, or	\$ 6.70
Total,	\$73.70

The figures in the square are really all that are required in obtaining results.

Or a dress goods salesman wants to find the value of 156 yards of cashmere at $62\frac{1}{2}$ c. per yard.

$$62\frac{1}{2}\text{c.} = 50\text{c.} + 12\frac{1}{2}\text{c.} (\frac{1}{4} \text{ of } 50).$$

$$156 \text{ yds. at } 50\text{c.} = \frac{1}{4} \text{ of } \$156.00, \text{ or } \dots\dots\dots \$78.00$$

$$156 \text{ " } 12\frac{1}{2}\text{c., or } \frac{1}{4} \text{ of } 50 - \frac{1}{4} \text{ of } \$78.00, \text{ or } 19.50$$

$$\text{Total} \dots\dots\dots \$97.50 \text{ Ans.}$$

Next the carpet man comes along and requires the value of 276 yards of carpet at $87\frac{1}{2}$ c. per yard.

$$87\frac{1}{2}\text{c.} = \$1.00 - 12\frac{1}{2}\text{c.} (\frac{1}{8} \text{ of } \$1.00).$$

$$276 \text{ yds. at } \$1.00 = \$276.00.$$

$$276 \text{ " } 12\frac{1}{2}\text{c.} = \frac{1}{8} \text{ of } \$276.00, \text{ or } \$34.50.$$

$$\text{Difference} = \$241.50 \text{ Ans.}$$

Now we come across the hardware dealer who desires the value of 18 saws at $\$1.18\frac{3}{4}$ c. each.

$$\$1.18\frac{3}{4} = \$1.00 + 12\frac{1}{2}\text{c., or } \frac{1}{8} \text{ of } \$1.00 + 6\frac{1}{4}\text{c., or } \frac{1}{2} \text{ of } 12$$

$$18 \text{ saws at } \$1.00 \dots\dots\dots \$18.00$$

$$18 \text{ " } 12\frac{1}{2} = \frac{1}{8} \text{ of } \$18.00, \text{ or } \dots 2.25$$

$$18 \text{ " } .06\frac{1}{4} = \frac{1}{2} \text{ of } \$2.25, \text{ or } \dots 1.13$$

$$\text{Total} \dots\dots\dots \$21.38 \text{ Ans.}$$

Any of the combinations shown on pages 27, 28 and 29 may be used in these extensions. If always on the watch for new ones and others that will suggest themselves from time to time, the work may shorten his work by half.

Sometimes instead of breaking the price into parts the quantity may be divided to better advantage.

Example: Find value of 375 yards of flannel at $16\frac{1}{2}$ c.

$375 = 300 + 50$ or $\frac{1}{2}$ of 100, + 25 or $\frac{1}{2}$ of 50.

100 yds. at $16\frac{1}{2}$ c. = \$16.50

300 " $16\frac{1}{2}$ c. = 16.50×3\$49.50

50 " $16\frac{1}{2}$ c. = $\frac{1}{2}$ of \$16.50..... 8.25

25 " $16\frac{1}{2}$ c. = $\frac{1}{2}$ of \$8.25..... 4.13

Total.....\$61.88 Ans.

In the following exercises be on the look out for short cuts and put them into practice where possible.

EXERCISE 45.

Extend the following:—

(1)

72 yds. Carpet.....@\$1.25
84 " "@ 1.50
76 " "@ 1.12 $\frac{1}{2}$
92 " "@ 1.27 $\frac{1}{2}$
98 " "@ 1.37 $\frac{1}{2}$

(3)

76 lbs. Cocoa.....@\$0.15
78 " "@ .17 $\frac{1}{2}$
92 " "@ .18 $\frac{3}{4}$
94 " "@ .20
96 " "@ .27 $\frac{1}{2}$

(5)

17 $\frac{1}{2}$ yds. Gingham...@\$0.16
18 $\frac{3}{4}$ " Muslin.....@ .18
16 " Cashmere..@ .45
30 " Voile.....@ .85
35 " Silk.....@ .62 $\frac{1}{2}$

(2)

48 lbs. Tea.....@\$0.22 $\frac{1}{2}$
49 " "@ .25
52 " "@ .27 $\frac{1}{2}$
61 " "@ .30
64 " "@ .32 $\frac{1}{2}$

(4)

546 bus. Barley.....@\$0.45
478 " Oats.....@ .35
638 " Peas.....@ .62 $\frac{1}{2}$
796 " Wheat....@ .87 $\frac{1}{2}$
847 " Rye.....@ .55

(6)

75 yds. Tapestry..@\$0.84
62 $\frac{1}{2}$ " Linoleum..@ 1.32
87 $\frac{1}{2}$ " Brussels..@ 1.76
137 $\frac{1}{2}$ " Oilcloth...@ .98
112 $\frac{1}{2}$ " Matting...@ 1.28

(7)		(8)	
99 yds. Silk.....@	\$1.78	250 lbs. Flour.....@	\$0.18 $\frac{3}{4}$
101 " Cloth.....@	.96	375 " Cocoa.....@	.16
136 " F. Satin....@	.49	75 " Flour.....@	4.50
178 " Sateen.....@	.51	175 doz. Brooms....@	1.66 $\frac{2}{3}$
96 " Satin.....@	1.10	78 boxes Starch....@	2.50
(9)		(10)	
240 bus. Wheat.....@	\$1.12 $\frac{1}{2}$	398 bus. Rye.....@	\$1.15
470 pairs Boots.....@	3.87 $\frac{1}{2}$	175 " Oats.....@	.46
760 gal. Syrup.....@	1.37 $\frac{1}{2}$	166 $\frac{2}{3}$ " Corn.....@	.64
118 bbls. Flour.....@	6.18 $\frac{3}{4}$	325 " Peas.....@	.48
742 bus. Barley.....@	.95	499 " Wheat....@	1.02

As in extending invoices, the nearest cent in the extension is usually all that is required, the following short cuts will often prove of advantage.

Example: Find the cost of $8\frac{1}{2}$ lbs. beef at $11\frac{1}{2}$ cents a lb. To the product of the whole numbers 8 and 11 = 88 add one-half of their sum $\frac{1}{2}(8+11)=9\frac{1}{2}$, or 10; $88+10=98$. Our answer is therefore 98 cents.

EXERCISE 46.

- | | | | |
|--------------------------------------|--------------------|-----------------------------------|--------------------|
| (1) $11\frac{1}{2}$ lbs. Cheese....@ | $9\frac{1}{2}$ c. | (6) $4\frac{1}{2}$ yds. Gingham@ | $18\frac{1}{2}$ c. |
| (2) $4\frac{1}{2}$ " Butter....@ | $17\frac{1}{2}$ c. | (7) $13\frac{1}{2}$ " Cotton .@ | $7\frac{1}{2}$ c. |
| (3) $9\frac{1}{2}$ " Lamb....@ | $15\frac{1}{2}$ c. | (8) $17\frac{1}{2}$ " Print ...@ | $9\frac{1}{2}$ c. |
| (4) $7\frac{1}{2}$ " Pork.....@ | $16\frac{1}{2}$ c. | (9) $23\frac{1}{2}$ " Muslin ..@ | $15\frac{1}{2}$ c. |
| (5) $12\frac{1}{2}$ " Beef.....@ | $10\frac{1}{2}$ c. | (10) $37\frac{1}{2}$ " Lace@ | $6\frac{1}{2}$ c. |

When the fractions are both quarters or fourths, to the product of the whole numbers add one fourth their sum. If both eighths add $\frac{1}{8}$ of sum; if thirds, add $\frac{1}{3}$ of sum; if sixths add $\frac{1}{6}$ of sum; and so on.

EXERCISE 47.

- | | |
|---|--|
| (1) $13\frac{1}{4}$ lbs. Pepper....@ $2\frac{1}{4}$ c. | (6) $12\frac{1}{8}$ yds. Muslin...@ $12\frac{1}{8}$ c. |
| (2) $14\frac{1}{4}$ " Nails.....@ $4\frac{1}{4}$ c. | (7) $7\frac{1}{2}$ " Cotton...@ $5\frac{1}{2}$ c. |
| (3) $17\frac{1}{4}$ yds. Cotton....@ $6\frac{1}{4}$ c. | (8) $16\frac{1}{2}$ lbs. Prunes...@ $8\frac{1}{2}$ c. |
| (4) $16\frac{1}{8}$ " Print.....@ $8\frac{1}{8}$ c. | (9) $7\frac{1}{6}$ doz. Eggs....@ $12\frac{1}{6}$ c. |
| (5) $11\frac{1}{8}$ lbs. Cheese.....@ $9\frac{1}{8}$ c. | (10) $12\frac{1}{8}$ " Orange...@ $16\frac{1}{8}$ c. |

When the whole numbers are the same and the fractions add to unity, as $9\frac{1}{8}$ yds. @ $9\frac{1}{8}$ c., add one to one of the whole numbers and multiply by the other, $(9+1) \times 9 = 90$. Ans. 90 cents.
 $8\frac{3}{4}$ lbs. @ $8\frac{1}{4}$ c. = $8+1 = 9 \times 8 = 72$. Ans. 72 cents.

EXERCISE 48.

- | | |
|--|--|
| (1) $9\frac{1}{2}$ lbs.....@ $9\frac{1}{2}$ c. | (6) $6\frac{5}{8}$ yds.....@ $6\frac{1}{8}$ c. |
| (2) $7\frac{1}{8}$ "@ $7\frac{7}{8}$ c. | (7) $4\frac{3}{5}$ "@ $4\frac{2}{5}$ c. |
| (3) $8\frac{3}{4}$ "@ $8\frac{1}{4}$ c. | (8) $9\frac{3}{8}$ "@ $9\frac{5}{8}$ c. |
| (4) $7\frac{4}{5}$ "@ $7\frac{1}{5}$ c. | (9) $8\frac{1}{2}$ "@ $8\frac{1}{2}$ c. |
| (5) $5\frac{2}{3}$ "@ $5\frac{1}{3}$ c. | (10) $3\frac{1}{3}$ "@ $3\frac{2}{3}$ c. |

EXERCISE 49.

- | | |
|---|--|
| (1) $12\frac{1}{2}$ lbs.....@ $7\frac{1}{2}$ c. | (16) $16\frac{1}{4}$ yds.....@ $6\frac{1}{4}$ c. |
| (2) $7\frac{1}{8}$ "@ $9\frac{1}{8}$ c. | (17) $14\frac{1}{3}$ "@ $8\frac{1}{3}$ c. |
| (3) $14\frac{1}{4}$ "@ $6\frac{1}{4}$ c. | (18) $12\frac{1}{4}$ "@ $12\frac{3}{4}$ c. |
| (4) $11\frac{3}{5}$ "@ $11\frac{2}{5}$ c. | (19) $18\frac{1}{2}$ "@ $7\frac{1}{2}$ c. |
| (5) $9\frac{1}{2}$ "@ $12\frac{1}{2}$ c. | (20) $11\frac{1}{8}$ "@ $11\frac{7}{8}$ c. |
| (6) $5\frac{3}{4}$ "@ $5\frac{1}{4}$ c. | (21) $17\frac{1}{3}$ "@ $9\frac{1}{3}$ c. |
| (7) $8\frac{1}{8}$ "@ $8\frac{7}{8}$ c. | (22) $8\frac{1}{4}$ "@ $16\frac{1}{4}$ c. |
| (8) $9\frac{1}{5}$ "@ $4\frac{1}{5}$ c. | (23) $14\frac{5}{8}$ "@ $14\frac{3}{8}$ c. |
| (9) $7\frac{3}{4}$ "@ $7\frac{1}{4}$ c. | (24) $13\frac{1}{8}$ "@ $17\frac{1}{8}$ c. |
| (10) $4\frac{1}{4}$ "@ $8\frac{1}{4}$ c. | (25) $18\frac{1}{4}$ "@ $3\frac{1}{4}$ c. |
| (11) $9\frac{3}{5}$ "@ $9\frac{2}{5}$ c. | (26) $17\frac{1}{3}$ "@ $9\frac{1}{3}$ c. |
| (12) $7\frac{1}{3}$ "@ $8\frac{1}{3}$ c. | (27) $15\frac{3}{5}$ "@ $15\frac{2}{5}$ c. |
| (13) $6\frac{2}{3}$ "@ $6\frac{1}{3}$ c. | (28) $16\frac{1}{8}$ "@ $5\frac{1}{8}$ c. |
| (14) $3\frac{1}{8}$ "@ $9\frac{1}{8}$ c. | (29) $15\frac{1}{2}$ "@ $7\frac{1}{2}$ c. |
| (15) $6\frac{1}{2}$ "@ $15\frac{1}{2}$ c. | (30) $25\frac{1}{4}$ "@ $25\frac{3}{4}$ c. |

EXERCISE 50.

Make out and extend invoices for the following:—

(1)

Debenham, Caldercott & Co., Limited, Toronto, sold to C. W. Jones & Co., Port Perry. 3/10, n/60. Ship via G.T.R.

10 pieces Muslin; 47, 49¹, 48¹, 46³, 46, 47¹, 48¹, 47³, 49, 46³,
@ 11c.

14 pieces White Cotton; 54, 57², 55³, 56, 58, 59¹, 56, 56³, 57¹,
58², 57³, 58, 55³, @ 7c.

15 pieces Grey Flannel; 39, 38², 37¹, 36³, 37, 39², 36³, 37², 39¹,
38³, 38, 39², 38¹, 37³, 36, @ 17c.

(2)

J. H. Fox, Orillia, Ont., bought of Flett, Lowndes & Co., Toronto, Ont., 3/5, n/30.

5 pieces silk; 33, 35², 34¹, 34, 33³, @ 87c.

7 pieces Foulard; 35, 36³, 36¹, 37², 35¹, 36, 35³, @ 23c.

9 pieces voile; 38, 37², 37³, 37, 39², 37, 39³, 38, 38¹, @ 94c.

(3)

Messrs. Bissonette & Case, St. Catharines, Ont., bought of W. R. Johnston & Co., Limited. 5/10, n/60; SS. "Lakeside."

11	Suits Tweed, Boys, No. 1407.....	@	\$ 2 35
14	" " " No. 1682.....	@	3.55
12	" " Men's, No. 7659.....	@	6.75
14	" " " No. 7784.....	@	9.35
16	" Serge " No. 6947.....	@	8.95
18	" Worsted, black, No. 7493.....	@	11.25
20	Overcoats, Boys, No. 1265.....	@	4.65
25	" Men's, No. 3900.....	@	12.75

(4)

Lang Bros., Berlin, bought of W. A. Murray Co., Limited,
Toronto. Terms 2/10, n/30. Ship via G.T.R.

12 doz.,	No. 432, Children's Hose.....	@	\$2.50
30 "	No. 426, Misses ".....	@	4.85
25 "	No. 458, Mixed Half-Hose.....	@	1.50
15 "	No. 132, Fancy ".....	@	2.00
12 "	No. 762, Gent's Gloves.....	@	8.00
18 "	No. 786, Ladies' ".....	@	7.50
9 "	No. 732, Men's Driving Gloves.....	@	9.00

Robinson, Little & Co., London, bought of Robert McKay
& Co., Hamilton. Terms n/60, 2/10. Ship via G.T.R.

15 doz.,	No. A762, Buttons.....	@	\$0.26
30 "	No. C468, Papers Hairpins.....	@	.65
40 "	No. C632, Hooks and Eyes.....	@	.40
60 "	No. B327, White Cotton Thread.....	@	.25
50 "	No. B326, Black ".....	@	.27
20 "	No. B376, Assorted Silk ".....	@	.40
10 "	No. B378, Assorted Embroidery Thread.....	@	2.25
10 "	No. 346, Skeins Linen Thread.....	@	.85

(6)

J. T. Petrie, St. Catharines, bought of H. P. Eckhardt &
Co., Limited., Toronto. Ship via SS. Lakeside.

1 box,	48 lbs. Ivory Gloss Starch.....	@	\$0.07½
1 keg,	100 " " " ".....	@	.06½
1 box,	40 " Akron " ".....	@	.05½
3 doz. ½	lb. tins Colman's Mustard, dozen.....	@	2.50
3 " ¼	" " " ".....	@	.85
75 lbs.	Mocha Coffee.....	@	.27½
75 "	Gilt Edge Coffee.....	@	.33

(7)

Messrs. Scott & Allin, Bowmanville, Ont., bought of Davidson & Hay, Toronto, Ont. Ship via G.T.R.

- 18 bbls. St. Lawrence Granulated Sugar; 208, 209, 214, 207, 206, 198, 199, 204, 206, 207, 209, 210, 214, 198, 199, 201, 203, 209 lbs. @ \$4.70 per cwt.
 9 bbls. Coffee Sugar; 212, 214, 217, 199, 198, 201, 206, 207, 209 lbs. @ \$4.50 per cwt.
 7 chests Tea, Oolong; 68-7, 69-8, 67-8, 66-7, 68-9, 67-8, 69-8, @ 22½c. per lb.
 5 half chests Tea, Ceylon; 32-4, 33-5, 34-5, 33-4, 32-5, @ 27½c.

(8)

Messrs. Eby, Blain & Co., sold to Mr. Robert Barron, City:

- 1 case, 2 doz. ½ lb. tins Bendsorp's Cocoa, @ \$4.75 per doz.
 1 box, 12 lbs., Baker's Premium No. 1, @ 37c. per lb.
 2 doz. ½ lb. pkgs., Chocolate Icings, @ 90c. per doz.
 1½ doz. Imperial Cheese, large, @ \$8.25 per doz.
 2 doz. Imperial Cheese, Medium, @ \$4.50 per doz.
 1 case, 4 doz., ½ lb. tins Magic Baking Powder, @ 95c. per doz.
 1 case, 3 doz., 12 oz. tins Imperial Baking Powder, @ \$3.40 per doz.

(9)

Mr. A. V. Bradley, 485 Spadina Crescent, City, bought of Warren Bros. & Co., Limited, Importers & Wholesale Grocers.

- | | | |
|--|----------|-----------|
| 25 lbs. Japan Rice..... | @ \$0.06 | (30 days) |
| ½ case Patras Carolina Currants, 77-9.. | @ .09 | (30 days) |
| 1 case Heliotrope Raisins, 36 lbs..... | @ .12½ | (Cash) |
| 2 boxes Select Raisins, 2/28, 56 lbs.... | @ .09½ | (30 days) |
| 3 boxes Surprise Soap..... | @ 4.30 | (Cash) |

(10)

Mr. A. W. Gee, cor. Spadina and Harbord Sts., City,
bought of Eby, Blain & Co., Limited.

4 doz. Keen's Mustard, $\frac{1}{4}$'s.....	@	\$0.45	(30 days)
70 lbs. White Sago.....	@	.07 $\frac{1}{2}$	(30 days)
1 case, 4 doz., Clark's Pork and Beans			
1's.....	@	.55	(Net cash)
3 doz. Leard's Lobsters, $\frac{1}{2}$'s.....	@	2.15	(Net cash)
1 case, 2 doz. Pantry Molasses.....	@	.95	(30 days)
2 boxes Val. Raisins, 28 lbs. each.....	@	.09 $\frac{1}{2}$	(30 days)
1 box Hele. Sed. Raisins, 36 lbs.....	@	.10 $\frac{1}{2}$	(Cash)
1 box Croesus Raisins, 45 lbs.....	@	.09	(Cash)

(11)

T. Kinnear & Co., Toronto, sold to A. H. Veale, Nestleton.
Terms n/30, or 1% for cash in 10 days.

3 boxes Loaf Sugar; 60-8, 61-8, 59-7.....	@	\$5.13	
5 bags Yellow Sugar, 100 lbs. each.....	@	4.03	
7 bbls. St. L. Gran.; 335-21, 337-22, 333-22, 336-23,			
333-21, 334-22, 338-25.....	@	4.48	

(12)

Fred R. Foley, Bowmanville, Ont., bought of Ames, Holden &
Co., Boot and Shoe Manufacturers, Toronto. Terms 2, 10, n/30.

16 pairs Men's Dongola Blucher.....	@	\$1.37 $\frac{1}{2}$	
7 " " " Congress.....	@	1.55	
3 " Boys' " Belmoral.....	@	.90	
4 " " Patent Blucher.....	@	2.50	
7 " Youtes' Dong. ".....	@	1.10	
8 Women's Glove Grain Bals.....	@	1.35	
6 Misses' Box Kip Bals.....	@	1.15	

(13)

Messrs. Wood Bros., St. Catharines, Ont., bought of John Lennox & Co., Hamilton, Ont., August 1st. 2% 10 days.

12 pairs	Men's Dongola Blucher.....@	\$1.35
5 "	" " Congress.....@	1.55
7 "	Boys' " Bal.....@	.95
9 "	" " Pat. Blucher.....@	2.45
11 "	Women's Glove Grand Bal.....@	1.30
6 "	Misses Box Kip Bal.....@	1.10
15 "	Child's White Canvas Oxfords.....@	.95
12 "	Infants' Dong. Button.. ..@	.60

(14)

G. H. Wilkinson, Windsor, bought of The Slater Shoe Co., Toronto. Ship via G.T.R. Terms 2/10, n/30.

8 pairs,	No. 285, Men's Pat. Blu. Ox.....@	\$2.90
10 "	No. 68, " Kip Blu.....@	1.93
9 "	No. 211, " Dong. Bal....@	2.60
6 "	No. 302, " Boys Buff Bal.....@	1.30
8 "	No. 446, Youth's Box Calf Blu.....@	1.60
12 "	No. 455 " Pat. Blu.....@	1.20

(15)

A. McDermind, Petrolia, bought of Weston Shoe Co., Toronto. Ship via G.T.R. Terms 3/10, n/60.

12 pairs,	No. 610, Women's Imp. Kid Theo... ..@	\$1.10
10 "	No. 613, " Dong. Ox.....@	1.00
6 "	No. 678, " Choc. Blu. Ox.....@	2.00
10 "	No. 805, Misses Dong. Bal.....@	1.15
7 "	No. 1041, Infants' Pat. Button.....@	.65
8 "	No. 855, Misses Tan Sandals.....@	1.25

(16)

Brockville, Ont., Feb. 12, 1907.

The James Smart Mfg. Co., Brockville, Ont., sold to Brooks
Hardware Co., Toronto, Ont. 3 months, 2% 10 days.

$\frac{1}{2}$ doz.	33 G.S. Fixtures.....	@	\$4.55
1	" G.S. Handles.....	@	1.25
$\frac{3}{4}$	" $1\frac{1}{2}$ Bench Screws.....	@	2.95
$\frac{1}{2}$	" $1\frac{1}{4}$ " ".....	@	3.15
$\frac{1}{2}$	" 4 C.R. Irons.....	@	10 75
$\frac{1}{2}$	" 30 Twine Boxes.....	@	2.35

Less 15% —

$4\frac{1}{2}$ doz.	Butts, 140 x 2.....	@	\$0.78
45	" " 104— $2\frac{1}{2}$ x $2\frac{1}{2}$	@	1.38
15	" " 3 x $2\frac{1}{2}$	@	1.58

Less 60, 15%.

(17)

Hamilton, May 12, 1907.

Orillia Hardware Co., Orillia, bought of H. S. Howland &
Sons, Limited.

5 kegs	$2\frac{1}{2}$ in. Flooring Nails.....	@	\$2.45
2	" 1 in. Finishing Nails.....	@	3.35
5	" 5 kegs $1\frac{1}{4}$ in. Slating Nails.....	@	2.95
12	" $2\frac{1}{2}$ in. Nails.....	@	2.55
5	" $3\frac{1}{2}$ in. ".....	@	2.25
3,	$5\frac{1}{2}$ ft. 0 Lance Cross Cut Saws.....	@	6.50
3,	$5\frac{1}{2}$ ft. 1 " " " ".....	@	6.10
$\frac{1}{2}$ doz.	18 Compass Saws, 16 in.....	@	9.00
$1\frac{1}{2}$	" 18 " " 12 in.....	@	7.50

Nails net; 40, 10% off Saws.

(18)

Coy Bros. & Southcott, St. Catharines, bought of Stanley Mills & Co., Hamilton. Via G.T.R. Terms 3/10, n/30.

15 gal. No. 67 S.W. Paint.....	@	\$1.80
4 " Linseed Oil.....	@	.60
5 " Turpentine.....	@	.75
10 " Raw Oil.....	@	.20

30% and 15%.

4 doz. Paint Brushes.....	@	7.20
3 " " ".....	@	4.80
5 quire Sandpaper.....	@	.25

25% and 10%.

(19)

T. D. Thomson, Owen Sound, bought of Wood, Valance & Co., Hamilton. Terms 2/10, n/30. Ship via C.P.R.

5 doz. Blind Hinges.....	@	\$0.84
4 " Door Knobs.....	@	1.75
2 " " Locks.....	@	22.50
3 " Sash Fasteners.....	@	1.04
4 " Frame Pulleys.....	@	1.40

10% and 5%.

2 sets bronze hinges.....	@	\$2.60
2 Bronze Front Door Locks.....	@	5.00

20% and 5%.

(20)

The Russill Hardware Co., Toronto, bought of Rice Lewis & Co., Toronto. Terms 2/10, n/30. Ship via Delivery.

4 sets Auger Bits.....	@ \$ 4.80
$\frac{1}{2}$ doz. Steel Squares.....	@ 13.50
$\frac{1}{2}$ " Spirit Levels.....	@ 16.50
1 " Jack Planes.....	@ 8.00
1 " Smooth Plane.....	@ 12.50

20%, 10% and 5%.

4 doz. Razors.....	@ 22.00
4 " Pocket Knives.....	@ 9.00

40% and 10%.

(21)

R. E. Kinsman Lumber Co., Hamilton, sold to Ed. C. Nicholson, St. Catharines. Terms n/60, 2/10. Ship via G.T.R.

2000 ft. 2 in. stock, W. Pine.....	@ \$40.00
1200 ft. $1\frac{1}{2}$ in. second clear W. Pine.....	@ 42.00
1500 ft. $1\frac{1}{4}$ in. " ".....	@ 40.00
3000 ft. 1 in. Com. Hemlock.....	@ 24.00
2600 ft. 1 in. M.R. Birch.....	@ 18.00
1750 ft. 1 in. M.R. Balsam.....	@ 22.00
1200 ft. 1 in. M.R. Spruce.....	@ 20.00

(22)

Ferguson Lumber Co., London, Ont., bought of the Rathbun Co., Toronto. Terms n/30, 3/10. Ship via C.P.R.

800 ft. 1 in. C and better Chestnut.....	@ \$19.50
250 ft. 1 in. M.R. Whitewood.....	@ 35.00
600 ft. 3 in. No. 1 W. Oak.....	@ 40.00
350 ft. 2 in. No. 2 R. Oak.....	@ 30.00
400 ft. 4 in. Stock S. Elm.....	@ 18.50
200 ft. $1\frac{1}{4}$ in. Com. W. Ash.....	@ 32.50
600 ft. 2 in. clear, Hickory.....	@ 35.00

(23)

Bean & Verral, Toronto, Bought of W. B. Bartram, Ottawa.
Terms 3/10, n/30. Ship via C.P.R.

50 pes. 2 x 12—12, No. 1 W. Pine.....	@	\$40.00
60 pes. 3 x 12—12, No. 1 ".....	@	40.00
1000 ft. 1½ in. Select W. Pine.....	@	50.00
1500 ft. 1 in. First Clear W. Pine.....	@	48.00
1200 ft. 6 in. E Flooring H. Maple.....	@	32.00
1800 ft. ½ in. Clear Siding.....	@	30.00
50 sq. XXX, W. Pine Shingles.....	@	4.50
60 bundles Lath.....	@	.28

(24)

H. Wise, St. Catharines, bought of Parry Sound Lumber Co., Parry Sound. Terms 2/10, n/60. Ship via G.T.R.

16 pes. 2 x 8—16, No. 1 Hemlock.....	@	\$28.00
12 pes. 2 x 6—16 " ".....	@	28.00
12 pes. 2 x 4—14 " ".....	@	27.50
2 pes. 6 x 8—14 Spruce.....	@	22.00
3 pes. 6 x 8—16 ".....	@	22.00
6 pes. 4 x 4—14 ".....	@	21.50
9 pes. 2 x 12—16 Hemlock.....	@	27.50

(25)

J. B. Brennen & Sons, Hamilton, bought of J. B. Smith & Co., Toronto. Terms 2/10, n/60. Ship via C.P.R.

4 pes. 8 x 8—16 Spruce.....	@	\$22.50
3 pes. 8 x 9—14 ".....	@	22.50
2 pes. 9 x 9—12 ".....	@	22.50
3 pes. 10 x 10—14 ".....	@	23.00
2 pes. 12 x 12—16 ".....	@	24.50
2 pes. 12 x 12—24 ".....	@	25.00
1600 ft. 1 in. M.R. Spruce.....	@	20.00
1250 ft. 1 in. Stock Spruce.....	@	22.00

